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The influence of FDI and environmental uncertainty on the business performance of enterprises-- A case study of manufacturing enterprises

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Abstract. Based on the panel data from 2016 to 2020 in various provinces, the influence of FDI and environmental uncertainty on the business performance of enterprises is analyzed in this paper. According to the research results, it is found that, under the regulation of environmental uncertainty, FDI has a significant positive influence on improving the business performance of China's enterprises, while the enhancement of environmental uncertainty will significantly weaken the influence of FDI on business performance of enterprises, namely, inhibition effect will appear;In addition, due to the different regulatory effects of factors including the degree of economic development in different regions, a significant difference between the influence of FDI on business performance has formed. Finally, from the macro perspective, some suggestions that the state and the government should give support to manufacturing enterprises from the aspects of macroeconomic environment and policies are proposed in the paper. And from the micro perspective, manufacturing enterprises should look for measures to release the vitality of enterprises according to the internal factors affecting the business performance from the behavior of their micro-economic subjects is also put forward in this paper.

Keywords: FDI; Environmental uncertainty; Business performance of enterprises; Manufacturing enterprises; Economic development

1. Introduction

Shortly after the founding of People the Republic of China, the original capital accumulation of early industrialization in China was completed through the domestic circulation and a small amount of FDI investment. However, the insufficient investment of FDI, few foreign strategic investors, low capital utilization rate of manufacturing enterprises, slow upgrading of new product technology, backward domestic scientific and technological level and poor economic environment efficiency greatly restricted the development of Chinese enterprises.Therefore, our country gradually opened the border, and strategic investors were introduced to accept the inflow of foreign capital, which helped made up for the deficiency of domestic construction funds and solved the problem of capital shortage plaguing most manufacturing enterprises; Simultaneously, China has also increased the introduction of foreign advanced technology and actively learned from foreign technology, which not only promoted the improvement of the technical level of domestic enterprises, but also made the development strategy and development mode of manufacturing enterprises develop in a diversified and internationalized way, so as to break the capital "bottleneck" restricting China's economic development, making domestic enterprises achieve better development.However, the introduction of a large number of foreign capital will lead to enterprises' excessive dependence, and even incur the confusion of domestic monetary and financial order, resulting in the financial crisis. Therefore, our country has also adopted corresponding policy measures to control the international flow of capital, so as to provide a stable economic environment for enterprises and better support the utilization of capital and improve the business performance of enterprises.

After the reform and opening up policy, an export-oriented economic development pattern dominated by the international cycle has gradually formed in China. According to the "Eleventh Five Year Plan" in 2006, we should "promote the transformation of economic growth from mainly

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relying on investment and export to consumption and investment, the coordination between domestic demand and foreign demand", and our country has entered an adjustment period of export-oriented economic development pattern.

Nowadays, China has become the country attracting the most foreign investment in the world, and FDI has become an important force to promote China's economic and social development. However, the fast development speed leads to unbalanced regional economic development, unbalanced regional development of direct foreign investment in China, and the degree of industry competition, economic development and the internal environment of manufacturing enterprises will have a great influence the role of FDI in the business performance of enterprises,Therefore, it is urgent for enterprises to clarify the relationship between FDI, environmental uncertainty and enterprise business performance, figure out how enterprises should make corresponding decisions under the comprehensive functions of multiple factors, and explore management methods and ideas suitable for dynamic changes, thus realizing "Learn from other's strengths to make up for our own deficiencies", so that foreign investment can bring more benefits to enterprises and promote the upgrading of industrial structure.Therefore, the focus of this paper is the research on the influence of FDI on the business performance of manufacturing enterprises under the regulation of environmental uncertainty and providing suggestions for manufacturing enterprises to adapt to the environment.

2. Literature review

According to existing literature, it can be concluded that the current academic research on business performance is mostly discussed from the internal and external factors of enterprises, mainly focusing on the influence of one or two specific factors on enterprises in a certain industry.

First of all, from the perspective of internal factors: Gan Luona (2017) took the influence of the salary gap between executives and employees on the enterprise's business performance into consideration, and believed that when this salary gap was within a certain moderate range, employees could be better motivated to work for the enterprise, and enterprises should reasonably design the salary incentive system to improve their business performance;Exploring from the perspective of external factors of enterprises, the scholar Peng Xinle (2019) reached the conclusion that there was an inverted "U" relationship between macroeconomic uncertainty and enterprise operating performance. According to this theory, our country should implement the target range management of macroeconomic uncertainty and adopt differentiated policies to promote the transformation and upgrading of enterprises in central and Western China.In brief, there are large numbers of researches on the business performance of enterprises, but the factors explored by most scholars are relatively single. For example, Yue Yujun (2022) only studied from the perspective of the influence of lagged investment in research and development (R & D, believing that the investment activities of manufacturing enterprises should be optimized and the cultivation of R & D personnel should be paid attention to, so as to create greater economic benefits for enterprises; However, the influence of internal and external factors on their benefits haven’t been systematically analyzed in most of these papers.

From the perspective of external factors: since the reform and opening up, FDI has been playing an increasingly important role in promoting the upgrading of the industrial structure of manufacturing enterprises. Therefore, many scholars have noticed that the entry of FDI has a significant overflowing effect on enterprises, and then studied the direct and indirect influence of FDI on Enterprises’ operating efficiency. From enterprise to industry, the relationship between FDI and enterprise operating performance from small to large have been investigated, and the intra industry overflowing and inter industry overflowing of FDI have been deeply explored.For instance, He Yue (2016) proposed that FDI had different effects on enterprises with different performance levels and different capital intensity. Chinese enterprises should improve their absorptive capacity and independent innovation ability, so as to shorten the time of absorbing overflowing effect and

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resist the influence of excessive FDI on the development of enterprises.There are few academic researches on the relationship between FDI, environmental uncertainty and business performance, instead, most of them focus on the relationship between these factors, and few scholars studied the relationship between the three.

Therefore, there are the following deficiencies in the existing research: ① From the perspective of research methods, many scholars have only made relevant analysis from the theoretical level, while there is a lack of empirical evidence. ② There are many factors affecting the income of enterprises.And previous studies mostly analyze it from the perspective of salary gap, investment in R & D and differences in enterprise strategies, and its influence on enterprise business performance was explored one-on-one;③ Samples in existing researched are mostly of prefecture level cities, which can not reflect the situation of various regions in China as a whole.

The marginal contribution of this paper is as follows: ① Through the principal component analysis and standardized processing of the panel data of each province, the environmental uncertainty index is obtained, and the model experiment is carried out based on FDI and enterprise performance;② The research content of environmental uncertainty is enriched, and the linear and nonlinear impact of FDI on enterprise performance under the comprehensive action of multiple factors such as industry competition, economic development and enterprise internal environment are analyzed; ③ Due to the selectivity of FDI investment in various regions,provinces and regions are divided into different categories to analyze the different impact of FDI on the business performance of enterprises in different regions.

3. Theoretical analysis and hypothesis

3.1 FDI and business performance of enterprises

At the beginning of the reform and opening up, China implemented the strategy of "Changing for technology through the market", subsequently, a series of policies aiming at promoting the growth of foreign direct investment are proposed; With the rapid economic growth after the reform and opening up, China attracted a large number of foreign direct investment, which not only directly brought cash exchange and stimulated China's economy, but also produced technology overflowing effect, improved China's industrial structure and promoted the industrial technology upgrading of Chinese enterprises.In recent years, FDI has gradually expanded to basic industries and high-tech projects. There are more and more capital intensive and technology intensive foreign direct investment projects, and competitions among enterprises has become increasingly obvious, the role of FDI in promoting economic development also affects the business performance of manufacturing enterprises.

Currently, as one of the main investment methods, FDI has been playing a vital role in the modern international capital market. The development of FDI mainly affects the business performance of enterprises from the following perspectives:First of all, with the development of China's economy, FDI will enter China's retail market more; Secondly, the investment performance of domestic retail industry is significantly lower than that of foreign investment, with obviously insufficient competitive strength; Thirdly, the high performance benefits brought by FDI in domestic retail industry may have a squeezing effect on domestic manufacturing industry. Based on the above analysis, hypothesis 1 is proposed in this paper.

Hypothesis 1: FDI has a significant positive influence on business performance of enterprises

3.2 FDI, environmental uncertainty and business performance of enterprises

Due to different levels of economic development in different regions, the upgrading of industrial structure of enterprises is not only influenced by factors inside the enterprise, but also affected by the macroeconomic environment comprehensively reflected by various factors.On the one hand, due to the structural convergence, there are small differences among these enterprises in terms of

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industrial technology, innovation ability and business scale. In addition, most enterprises have single production mode and high degree of specialization, and the fluctuation of economic market has a great influence on the business performance of enterprises; On the other hand, when enterprises are affected by environmental uncertainty, the integration of environmental uncertainty and enterprises may exert a joint effect, which can reverse the adverse influence of FDI on enterprise performance and efficiency.Specific reasons are as follows: first of all, environmental uncertainty can make enterprises have a strong sense of crisis, further promote enterprises' research and development (R & D) of product and innovation, and then improve enterprise business performance; Secondly, enterprises can upgrade and optimize a single industrial structure through environmental uncertainty, improve resource allocation and utilization efficiency, and accurately pinpoint their business strategies through market fluctuations.Therefore, in the era of data, the uncertainty of the environment also has a significant influence on the business performance of enterprises, and the final result is determined by the regression result, based on which hypothesis 2 and hypothesis 3 are proposed in this paper.

Hypothesis 2: Environmental uncertainty has a significant positive influence on the business performance of enterprises;

Hypothesis 3: FDI and environmental uncertainty have a significant positive influence on business performance of enterprises.

4. Experimental design

4.1 Construction of the measurement model

Based on the above analysis, the panel data of different provinces in recent five years will be adopted in this paper to study the relationship between FDI, environmental uncertainty and business performance. Therefore, spatial interaction is introduced into the general linear model.The following model is established:

$$EROE_{it} = \alpha_0 + \alpha_1 FDI_{it} + \alpha_2 PEU_{it} + \alpha_3 SAED_{it} + \alpha_4 LSOP_{it} + \alpha_5 DPA_{it} + \alpha_6 SATP_{it} + \alpha_7 TOBINQ_{it} + \varepsilon_{it}$$

To further study the correlation effect of FDI on business performance under the regulation of environmental uncertainty, the intersection term of FDI and environmental uncertainty have been added to the theoretical model, and the following model is established:

$$EROE_{it} = \alpha_0 + \alpha_1 FDI_{it} + \alpha_2 interact_{it} + \alpha_3 SAED_{it} + \alpha_4 LSOP_{it} + \alpha_5 DPA_{it} + \alpha_6 SATP_{it} + \alpha_7 TOBINQ_{it} + \varepsilon_{it}$$

Among them, i represents the province; t represents the year; EROEit represents the Business performance of enterprises;PEUit represents Environmental uncertainty； Xit represents control variable，containing Social economicdevelopment indicators（SAEDit）、Internet development（LSOPit）、Solvency（DPAit）、The level of scientific and technological progress（SATPit）、Ability to grow（TOBINQit）;α0 ,…,αn are all parameters to be evaluated;εit is a perturbation item.

4.2 Selection of variables

4.2.1 Interpreted variables

Business performance of enterprises.The business performance of an enterprise refers to the business efficiency of the enterprise and the performance of the operator during a certain business period. At present, there are many methods to measure the business performance of enterprises, but to more accurately and comprehensively show the business performance of enterprises, the method of constructing comprehensive indicators (Hu Wei (2020)) was selected in this paper paper.The whole system consists of four single index layers, namely, total asset net profit margin, business profit margin, asset liability ratio and total asset growth rate, based on which the selected specific values are adjusted according to the availability of data, so as to make it applicable to this paper.

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First of all, four single indicators are linearly standardized, namely, the value of each indicator is converted into the value range of t = [0, l] through mathematical transformation, thus eliminating the contradiction between indicators and its the incommensurability. The calculation formula is as follows:

$$\mathrm{EROE_{it}} = \mathrm{x} = \frac{\mathrm{EROE_{it}} - \min\ （\mathrm{EROE_{it}）}}{\max\ （\mathrm{EROE_{it}）}\ - \min\ （\mathrm{EROE_{it}）}}$$

Among them, i represents the province; t represents the year; EROEit represents the Business performance of enterprises； max and min are the maximum and minimum values of the four individual indicators of each province each year.

Second, calculate the adjustment coefficient (wit) and average adjustment coefficient () of each single index, namely, the weight.

Thirdly, based on the standardized value of each single index and the average adjustment coefficient, the business performance of enterprises in each province is finally calculated, and the calculation formula is as follows:

$$\mathrm{EROE_{it}} = \frac{1}{4}\sum_{\int=1}^{4} \mathrm{EROE_{it}} \times \overline{\mathrm{W}}_{\mathrm{it}}$$

4.2.2 Explanatory variables

FDI.In this paper, an empirical analysis on the panel data from 28 provinces is carried out. Foreign direct investment makes excellent technology and a large amount of funds flow into China, which changes the original investment structure, promotes the production diversification of manufacturing enterprises, and then its own industrial chain was formed.

4.2.3 Adjust variables

Environmental uncertainty.Environmental uncertainty includes not only the macro-economic environment, but also internal factors that can affect the transformation and upgrading of manufacturing enterprises and enhance their innovation momentum, it has a profound impact on the relationship between the coordination of supply chain and performance of manufacturing enterprises.Through the principal component analysis of five variables: industry competition degree, economic development degree, profitability, cash holdings and leverage ratio, the environmental uncertainty index is obtained in this paper, selected variables are shown in Table 1. The calculation process of regulatory variable environmental uncertainty data is the same as that of enterprise business performance.

4.2.4 Control variable

Furthermore, in order to more accurately analyze the influence of FDI regulated by environmental uncertainty on enterprise business performance, the following variables affecting enterprise business performance are also controlled in this paper, as shown in Table.

4.3 Sample selection and source of data

Taking manufacturing enterprises in A-share listed companies from 2016 to 2020 as the research sample, in which those with missing data were excluded, and an empirical analysis on the panel data of 28 provinces and municipalities directly under the central government nationwide except Guangxi, Jilin and Tibet were carried out.Data adopted were mainly from China Statistical Yearbook, Provincial Statistical Yearbook, Statistical Yearbook of China’s Tertiary Industry, Peking University Digital inclusive financial index, National Bureau of statistics and GuoTaian database (CSMAR). The data processing of this paper is carried out using stata16 econometric analysis software.

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5. Empirical analysis

Table 1 Related variables and descriptions

Variable type	Variable name	Variable symbol	Variable description
Interpreted variables	Business performance of enterprises	EROE	total asset net profit margin, business profit margin, asset liability ratio and total asset growth rate
Explanatory variables	FDI	FDI	Data for 5 years by region
Adjust variables	The degree of competition in the industry	IC	Industry average of operating profit/operating income
	Degree of economic development	EDL	Regional GDP/GDP
	Profitability	ROA	Year-end net profit/total assets
	Cash holdings	CASH	Number of monetary funds / total assets
	leverage	LR	Total Liabilities/Total Assets
Control variable	Social economic development indicators	SAED	R&D expenditure of industrial enterprises above designated size
	Internet development	LSOP	Online mobile payment levels
	Solvency	DPA	liquidity ratio
	The level of scientific and technological progress	SATP	Total technical contract turnover
	Ability to grow	TOBINQ	Growth rate of total assets

5.1 Descriptive statistics and analysis of variables

In Table 2, descriptive statistics of variables in the model used in this paper are summarized. FDI ranges from 0.0446 to 283.8, with an average value of 89.43, indicating that there are certain differences in FDI among enterprises in different provinces, which has a certain influence on the business performance of enterprises.

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Table 2 Descriptive statistics for variables

Variable type	Variable symbol	Variable name	Total number of variables	Minimum	Maximum	average	Standard Deviation
Interpreted variables	EROE	Business performance of enterprises	140	-5.030	1.570	0.000429	0.784
Explanatory variables	FDI	FDI	140	0.0446	283.8	89.43	79.37
Adjust variables	PEU	Environmental uncertainty	140	-6.410	4.150	-0.00386	0.912
Control variable	SAED	Social economic development indicators	140	67716	25000000	4593000	5551000
	LSOP	Internet development	140	181.7	29545	664.1	3353
	DPA	Solvency	140	1.411	12.850	2.985	1.465
	SATP	The level of scientific and technological progress	140	34431	63160000	6294000	10360000
	TobinQ	Ability to grow	140	-0.136	2.219	0.144	0.226

5.2 Correlation results and analysis

In Table 3, the correlation results of the relevant variables of the data model is shown, which preliminarily reflects the influence on the business performance of the enterprises. According to the specific data, the correlation between FDI and business performance is: the coefficient 0.375 has a significant positive correlation at the 1% level, and the hypothetical conclusion has been verified; However, it is difficult to draw a direct conclusion from the correlation between the regulatory effect of environmental uncertainty and regional heterogeneity, therefore, further regression test is needed.

Table 3 Correlation results

	EROE	FDI	PEU	LSOP	TOBINQ	SAED	DPA	SATP
EROE	1							
FDI	0.375	1						
PEU	0.691	0.0520	1					
LSOP	0.0120	0.131	0.0440	1				
TOBINQ	0.430	0.0600	0.0560	-0.0130	1			
SAED	-0.107	0.271	-0.141	-0.0370	0.00400	1		
DPA	-0.171	-0.0550	-0.401	-0.0640	-0.0410	-0.0270	1	
SATP	0.0720	0.463	-0.00300	0.0340	0.0300	0.0730	-0.139	1

5.3 Regression results and analysis

5.3.1 The main effect model

Based on the above correlation test on the business performance of enterprises, the regression analysis of the main effect model is further carried out. According to relevant results obtained through stata16 software and listed in Table 4, Model 1 indicates that in the mixed effect, FDI has a significantly positive influence on business performance, and model 2 indicates that in the fixed effect, the influence of FDI on business performance may be disturbed by some other factors.Under the random effect, hypothesis 1 is verified because a large amount of capital inflow is needed for the development of enterprises in recent years, the domestic financial market is not developed

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enough, and the financing channels of manufacturing enterprises are limited and the cost is high. Therefore, foreign capital brings new technologies and products, and foreign capital makes up for the lack of funds of Chinese enterprises as a supplementary source of funds.It can be vividly reflected that, from 2016 to 2020, the business performance of enterprises in various provinces in China was significantly affected by FDI at the level of 1%, indicating that FDI has a positive effect on the improvement of business performance efficiency in the whole region. Therefore, the in-depth development of FDI will help to improve the business performance of enterprises.

Table 4 Main effects models

	Model 1	Model 2
VARIABLES	y	y
FDI	0.005***	0.002
	(6.88)	(1.23)
SAED	-0.000***	-0.000***
	(-3.37)	(-3.64)
TOBINQ	1.382***	1.450***
	(3.48)	(7.61)
SATP	-0.000***	-0.000**
	(-3.69)	(-2.75)
LSOP	-0.000***	-0.000
	(-2.65)	(-0.27)
DPA	-0.086	-0.238**
	(-0.69)	(-2.44)
Constant	-0.132	1.058**
	(-0.40)	(2.66)
R-squared	0.397	0.558
Company FE		YES
F test		0
r2_a		0.538
F		33.77

Note: ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

5.3.2 Regulation effect

The regulation effect is shown in Table 5. From the perspective of regulatory variables, business performance is significantly positive at the significance level of 1%, indicating that the regulatory effect of environmental uncertainty has a positive influence on business performance.Furthermore, in model 3, the FDI coefficient passes the significance test at the level of 1%, and are positive, indicating that under the regulation of environmental uncertainty, FDI can significantly promote business performance, which also proves the correctness of hypothesis 1.Through further observation of the regulatory effect model 5 and model 6, it is found that the interaction term between environmental uncertainty and FDI is significantly positive at the level of 1%, indicating that the joint action of FDI and environmental uncertainty can promote the improvement of enterprise operating performance, which also proves that hypothesis 3 is right.

After the reform and opening up policy, China has implemented an unbalanced development strategy. The eastern region developed first, and its economic growth rate and market opening degree were higher than those in the central and western regions, attracting a large amount of FDI, therefore, technology overflowing effect, and the industrial structure has developed to a relatively high level;Since the implementation of the western development strategy, the improvement of infrastructure construction and the abundance of natural resources in the western region have provided an opportunity for it to develop new energy manufacturing enterprises, and have a high degree of response to FDI, forming the diversified demand of different subjects in the economic market, this requires enterprises to accurately implement environmental uncertainty. Combining the

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active construction of various provinces and the low threshold of technological exchange among enterprises, enterprises have more economic behaviors, which promote its business performance.Therefore, we can see that there are individual differences among different provinces, and the degree of FDI investment differences among provinces caused by cross period factors should also be further confirmed by adding regulatory variables to the experiment.

Table 5 Moderating effect models

	Model 3	Model 4
VARIABLES	y	y
FDI	0.004***	0.001
	(7.94)	(0.48)
PEU	0.587***	0.724***
	(6.99)	(9.11)
SAED	-0.000*	-0.000**
	(-1.72)	(-2.34)
TOBINQ	1.298***	1.283***
	(8.20)	(36.34)
SATP	-0.000***	-0.000
	(-3.83)	(-0.96)
LSOP	-0.000***	-0.000
	(-2.62)	(-0.76)
DPA	0.064	0.007
	(1.60)	(0.17)
Constant	-0.606***	0.390
	(-5.19)	(1.48)
R-squared	0.770	0.844
Company FE		YES
F test		0
r2_a		0.836
F		895.7

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Table 6 Modulation effect model

	Model 5	Model 6
	y	y
FDI	0.004***	0.001
	(6.146)	(0.39)
interact	0.006***	0.005***
	(4.133)	(2.81)
SAED	-0.000*	-0.000***
	(-1.851)	(-3.57)
TOBINQ	1.305***	1.362***
	(3.899)	(9.84)
SATP	-0.000**	-0.000**
	(-2.573)	(-2.32)
LSOP	-0.000***	-0.000
	(-3.229)	(-1.07)
DPA	-0.084	-0.243**
	(-0.672)	(-2.59)
_cons	-0.192	1.284***
	(-0.588)	(3.09)
Company FE		YES
F test		0
r2_a		0.556
F		33.52

Note: ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

5.3.3 Regional heterogeneity test

Based on the above empirical results, there is a strong correlation among FDI, environmental uncertainty and business performance in the whole space, but in partial space, due to a series of reasons including the provincial economic environment and infrastructure investment level, an opposite or completely contrary conclusion may appear. Therefore, taking the dimension of provincial location as the basis for provincial division, its heterogeneity is further expanded and analyzed.

First of all, considering the obvious economic orientation of environmental uncertainty, 28 provinces are divided into three categories: eastern, central and western provinces. Subsequently, through the model applicability test, the adjustment effect is still adopted for analysis, and the results are listed in the table below. From a general perspective, there are some differences in the significance of main variables in different regions;In the mixed effect, based on the interaction term between environmental uncertainty and FDI, the interaction term coefficient between environmental uncertainty and FDI in the East is significantly positive at the level of 1%, which is because the degree of opening to the outside world and the degree of competition among enterprises in the Eastern areas are high, therefore, FDI has a significant positive influence on the improvement of enterprise performance under the regulation of environmental uncertainty.Furthermore, because industries of the central areas focus more on cultural industries, namely, it implements the strategic layout based on soft power, its environmental uncertainty has an inhibitory effect on the upgrading of industrial institutions, therefore, its results have not passed the significance test;The result of the interaction coefficient between environmental uncertainty and FDI in the west is the same as that in the East, which shows that the business performance of manufacturing enterprises in the west is significantly regulated by FDI and environmental uncertainty.

In brief, according to the regression results, FDI can correct or reduce the influence of environmental uncertainty on business performance in a certain degree, namely, environmental uncertainty significantly promotes the business performance of enterprises in eastern provinces and has little influence on the business performance of enterprises in central provinces.

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It is found in this paper that there are a good natural environment and rich geographical resources in the Western area, with the new energy industry as the main industry, while the Eastern area is dominated by the infrastructure industry, which are greatly affected by the environment. Therefore, FDI is affected by environmental uncertainty, which has a more significant influence on the business performance of enterprises in the East and west regions, while the central region plays a linking role, which results in relatively insignificant results.

Table 7 Regional heterogeneity model

	Model 7			Model 8		
	East	Central	West	East	Central	West
VARIABLES	y	y	y	y	y	y
FDI	0.003***	0.003**	0.007**	0.000	-0.003	0.008
	(4.40)	(2.36)	(2.05)	(0.19)	(-0.96)	(0.60)
PEU	0.710***	0.211	0.531***	0.517***	1.044***	0.782***
	(2.97)	(0.59)	(7.88)	(3.05)	(3.79)	(11.39)
TOBINQ	1.076***	1.183**	1.234***	1.247***	0.969***	1.310***
	(5.43)	(2.33)	(6.26)	(7.84)	(2.92)	(9.97)
SAED	-0.000	-0.000***	0.000**	0.000	-0.000***	0.000
	(-1.03)	(-2.88)	(2.45)	(0.22)	(-5.84)	(0.34)
LSOP	-0.000	-0.000***	-0.002	0.000	-0.000	-0.003
	(-0.41)	(-2.86)	(-1.13)	(0.36)	(-0.29)	(-1.32)
SATP	-0.000	-0.000	-0.000	-0.000***	0.000	-0.000
	(-1.24)	(-1.38)	(-1.54)	(-3.61)	(0.54)	(-1.07)
DPA	0.248***	0.171	-0.002	0.047	0.067	0.054
	(6.50)	(1.26)	(-0.04)	(0.74)	(0.69)	(1.22)
Constant	-1.059***	-0.470	-0.057	0.057	1.810***	-0.015
	(-8.09)	(-1.51)	(-0.10)	(0.17)	(3.17)	(-0.03)
Observations	50	40	50	50	40	50
R-squared	0.836	0.651	0.863	0.858	0.771	0.912
Company FE				YES	YES	YES
F test				0	1.23e-06	0
r2_a				0.790	0.643	0.869
F				28.58	12.05	48.76

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Table 8 Regional heterogeneity model

	Model 9			Model 10		
	East	Central	West	East	Central	West
	y	y	y	y	y	y
FDI	0.003***	0.003***	-0.005	0.000	-0.001	-0.003
	(5.290)	(3.821)	(-0.700)	(0.19)	(-0.28)	(-0.10)
interact	0.005***	-2.959	0.017***	0.004***	8.435**	0.015
	(2.868)	(-1.130)	(3.831)	(3.34)	(2.48)	(0.84)
TOBINQ	1.208***	1.527***	1.063***	1.268***	0.889**	1.353***
	(7.937)	(3.391)	(3.154)	(8.45)	(2.20)	(4.69)
SAED	-0.000	-0.000***	0.000	-0.000	-0.000***	0.000
	(-1.290)	(-3.154)	(0.696)	(-0.13)	(-5.45)	(0.20)
DPA	0.304***	0.098	-0.227*	0.068	0.069	-0.282***
	(7.880)	(0.723)	(-1.799)	(1.08)	(0.63)	(-3.94)
SATP	-0.000	-0.000*	0.000	-0.000***	0.000	-0.000
	(-0.476)	(-1.725)	(0.048)	(-3.62)	(0.37)	(-0.66)
LSOP	-0.000	-0.000	0.000	0.000	-0.000	-0.000
	(-0.611)	(-0.914)	(0.050)	(0.31)	(-0.64)	(-0.00)
_cons	-1.332***	-0.000	0.214	0.025	0.002**	0.473
	(-8.235)	(-0.995)	(0.222)	(0.08)	(2.58)	(0.36)
Company FE				YES	YES	YES
F test				0	1.92e-05	8.97e-05
r2_a				0.799	0.549	0.368
F				30.03	8.790	6.364

Note: ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

6. Conclusions and suggestions

Based on the provincial panel data of 28 provinces (including municipalities directly under the central government) in China from 2016 to 2020, the influence of FDI and environmental uncertainty on enterprise performance is empirically analyzed and studied in this paper through multiple models. Main conclusions are as follows: the development of FDI has a significant pulling effect on business performance;Under the regulation of environmental uncertainty, FDI investment has a significant positive influence on improving the business performance of Chinese enterprises, in addition, FDI will weaken the influence of environmental uncertainty on enterprise benefits in a certain degree.Moreover, due to differences in the regional economic level of each province, the influence of FDI and environmental uncertainty on the business performance of enterprises is heterogeneous in different provinces. The infrastructure in the eastern region is more developed and natural resources in the western region are more abundant. Therefore, for the Eastern and Western areas, FDI is more significantly regulated by environmental uncertainty, while the influence on manufacturing enterprises in the central region is not significant.

Therefore, to make better use of FDI and environmental development and promote the improvement of enterprise business performance, the following suggestions are proposed in this paper.

(1) Enterprises should lay great emphasize on technological innovation, attract strategic investors, re-establish new innovative ideas with the support of national policies and the market economy environment, reduce costs and improve business performance through relevant technologies.At

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present, enterprises have made significant contributions to their business performance from their own FDI. Furthermore, there is huge room for the improvement of regional FDI in China, our country should expand the scale and intensity of investment, attract foreign direct investment, improve the innovation ability of enterprises, reduce costs and promote the progress of business performance while ensuring the completion of primary industries.

(2) Government should formulate and implement relevant policies based on local conditions. There are differences in the economic level and infrastructure investment proportion among different provinces in China. Therefore, the government cannot take "Only one standard" measures. Instead, it should increase the investment level in infrastructure construction in the central region through special subsidies and financial support, improve the economic environment of the central region, promote enterprises to accelerate their integration into the environment, narrow the infrastructure gap between eastern, central and western provinces, and further promote the growth of business performance of enterprises in the central region, with these measures taken, the balanced development of the eastern, central and western regions will be achieved.

(3) Promote the cooperation between the government and enterprises, make full use of big data and reduce information asymmetry. For the uncertainty of macro and micro environment, manufacturing enterprises can promote the establishment and continuous iteration of big data platform "from top to bottom" through the top-level design strategic framework, connect the business data inside the enterprise and at home and abroad, break through the barriers of data resources and deeply cultivate the value of data.Simultaneously, our country should accelerate the construction of intelligent, international and comprehensive digital information infrastructure in the central and western regions, so that enterprises can fully integrate internal and external information, strengthen communication with investors, reduce information asymmetry, maintain flexibility, which will be of reference significance for the decision-making process of enterprises.

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