



# THE INFLUENCE OF EXTERNAL ECONOMIC POLICY FLUCTUATION ON ENTERPRISE PRODUCTIVITY: BASED ON CHINESE-LISTED ENTERPRISES

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## Article History:

- received 27 June 2023
- accepted 11 August 2024
- first published online 6 November 2024

**Abstract.** Drawing upon a comprehensive dataset encompassing Chinese publicly traded enterprises across the two-decade span from 2000 to 2020, this article analyzes the effects of external economic policy variations on the productivity of Chinese enterprises. The consequences show that when facing the aggravation of external variations in economic policy, enterprises prefer to enhance total factor productivity and labor productivity to reduce the risk caused by the expansion of external uncertainty. Moreover, the greater the degree of internationalization of an enterprise, the higher its vulnerability to variations in external economic policies. The mechanism test shows that for enterprises that only participate in domestic circulation, external economic policy fluctuations improve productivity by affecting the operating environment; however, when enterprises join in the dual circulation, the fluctuations will promote productivity by affecting the scale of enterprises' overseas business instead.

**Keywords:** external economic policy fluctuation, enterprise productivity, dual circulation, operating environment, overseas business.

**JEL Classification:** C33, D24, D81.

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## 1. Introduction

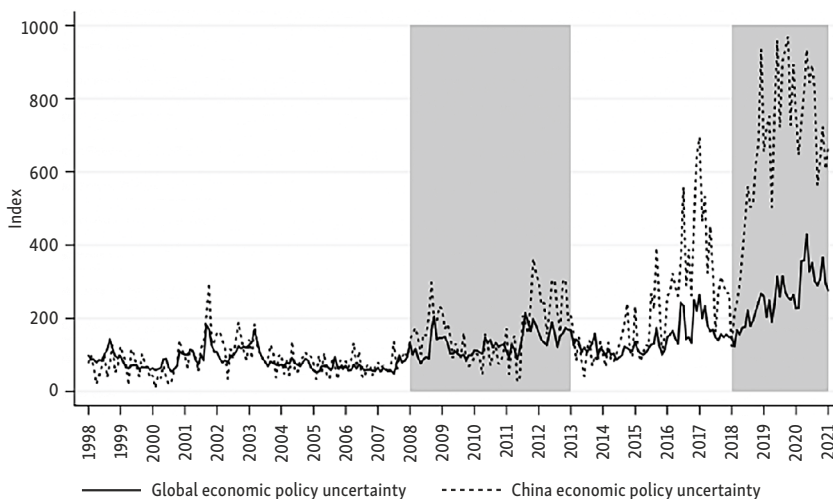
To navigate the intricate domestic and international landscape of the new era, mitigate the impact of economic policies on businesses, and ensure their sustained growth, numerous nations have formulated a range of economic development strategies. China has undertaken a multifaceted approach, encompassing the deepening of supply-side structural reforms, the establishment of a novel development paradigm that harmoniously intertwines domestic and international economic cycles, and the proactive tackling of uncertainties in global economic development. The government attempts to improve productivity and achieve the sustainable development of enterprises by formulating policies.

Over the recent years, the confluence of escalating trade protectionism, unilateral actions, and the ongoing global COVID-19 pandemic has compelled nations to recalibrate their fiscal and monetary policies in an attempt to stimulate economic growth. Unfortunately, these adjustments have inadvertently intensified the volatility within and across national economic

policy landscapes. As depicted in Figure 1, both the Global Economic Policy Uncertainty Index and the Chinese Economic Policy Uncertainty Index exhibit a pronounced upward trajectory, particularly over the past decade, underscoring heightened levels of economic policy uncertainty on both global and domestic fronts. In this complex international situation, will enterprises be affected? Compared with developed countries, since developing countries are still in the phase of fleetly economic development, the external impact on their enterprises is often more important for the overall development of the country. Especially for China, under this impact, will the enterprises' productivity be reduced, or will it still maintain stability and continue the miracle of the increase of Chinese economy? Hence, this paper delves into the intricate mechanisms underlying the heightened volatility of external economic policies, with a focus on enterprise productivity as the central pivot. By adopting the lens of the economic dual-circulation paradigm, it offers insightful policy recommendations aimed at enhancing China's macroeconomic policy framework and fostering the sustainable development of enterprises.

Based on this, there are two main motivations for this paper:

- (1) Motivation on the theoretical level: The question arises whether the unpredictability of the external environment has a positive or negative influence on the efficiency of enterprise production. If it has a positive impact, what are the channels through which it is achieved? And if it is negative, what are the reasons? This paper conducts a comprehensive regression analysis to meticulously examine the influence of the Global Economic Uncertainty Index on the Total Factor Productivity (TFP) of enterprises, offering a nuanced understanding of the interplay between economic uncertainty and corporate performance.
- (2) Motivation on the practical level: Given the current complex global economic situation, China's economic development is facing numerous external shocks. In particular, the hard constraints faced by market players in terms of costs, resources, and the environ-



**Figure 1.** Index of Global and China economic policy uncertainty (data source: Economic Policy Uncertainty Index, n.d.)

ment are constantly increasing. Studying the impact of uncertainty in China's economic policies on the production efficiency of enterprises can provide valuable reference models for developing countries in formulating policies to cope with external shocks.

There are three main innovations in this paper:

Firstly, the paper delves into the effects of external uncertainty on micro-entities. Given the intricate and turbulent global economic backdrop, this paper meticulously examines the relationship between global economic policy instability and the productivity of Chinese enterprises by leveraging data from the Economic Policy Uncertainty Index and corporate efficiency metrics spanning the period from 2000 to 2020. This can provide more valuable references for developing countries in formulating policies to cope with external shocks.

Secondly, the study meticulously explores the intricate mechanisms through which the "dual-cycle" development paradigm acts as a shield, blunting the disruptive force of external uncertainties. By examining this strategic approach within the context of the Chinese government's 2020 dual-cycle new development paradigm, which prioritizes the domestic economy as the cornerstone and the international economy as a supportive extension, we gain valuable insights into how it functions as a robust buffer against global economic volatility. This analysis, grounded in the dual-cycle perspective, enriches our understanding of how the innovative development model effectively adjusts to and mitigates the impacts of external policy fluctuations on the productivity of Chinese enterprises.

Thirdly, we consider the impact mechanism of risk superposition. The study delves into the unpredictability of China's economic strategies, examining the combined effects of these uncertainties on the overall productivity of Chinese businesses, and investigates if their interplay leads to a risk superposition phenomenon.

## 2. Literature review

In the context of China's dual circulation development, this article analyzes how external uncertainty affects the productivity of enterprises. Current studies in the field of enterprise productivity are categorized into two distinct areas: the definition of enterprise productivity and the impact of external shocks on enterprises. We will also introduce the concept of China's dual circulation.

### 2.1. Definition of enterprise productivity

The available literature on the definition of enterprise productivity is as follows. Firstly, certain research employs the overall factor productivity of businesses (TFP) as a metric for assessing their efficiency. After obtaining venture capital, enterprises will allocate production factors according to the market, so the productivity will change with the variability of industry and time, and the change of TFP can dynamically reflect the ability of enterprises to deal with the change of market information. As mentioned in most studies, technological progress is the cornerstone of the survival and enterprises' development, but financial indicators (such as Return On Assets) cannot fully reflect the information on the enterprises' technological innovation. However, TFP is directly related to the technological level of enterprises, it can better

reflect the enhancement of enterprise productivity and the way to increase the enterprise value. Secondly, Gollin et al. (2014), and Qiao et al. (2018) analyzed agricultural enterprise productivity by using its labor productivity.

## 2.2. Impact of external shocks on enterprises

With the gradual acceleration of economic globalization, the external market environment faced by enterprises is constantly changing, and the impact of the external environment can have a series of effects on enterprises. On the one hand, there are negative impacts of external fluctuations on enterprise development: Qian and Fang (2023) analyzed the effect of cross-border related demand fluctuations on the endogenous quality of enterprises, finding that uncertainty in cross-border external demand hinders enterprises from improving export quality and increases their cost of quality improvement. Tan and Zhang (2017) found that economic strategy uncertainty curbs investment by Chinese enterprises through two channels: physical options and financial friction. Fan et al. (2020) found that under the influence of economic policy uncertainty, corporate investment will delay investment, intensify external financing constraints, and inhibit the sustainability of corporate innovation. On the other hand, there are positive impacts of external fluctuations on enterprise development: Jin (2021) pointed out through analysis that external uncertainty can enhance the moderating effect of absorptive capacity on enterprise performance. Cao et al. (2019) empirically analyzed and concluded that economic policy fluctuations will prompt corporate management to adopt more diversified strategies, and suggested that enterprises cautiously implement diversified strategies and adapt to changing circumstances. Seeking high quality development is the inevitable requirement for enterprises in the new era, and fluctuations in economic policies can have an important impact on enterprise upgrading and high-quality development. Deng et al. (2020) studied the influence of policy uncertainty on enterprise transformation and upgrading from three perspectives: capital structure, innovation development capabilities, and performance levels, and found that uncertainty surrounding policies can drive enterprise to increase R&D investment, enhance innovation capabilities, and thus promote high-quality development (Qu & Liu, 2021). Yang et al. (2021) studied the influence of external economic uncertainty surrounding policies on enterprise upgrading and high-standard development, and believed that exterior uncertainty has a positive incentive consequences for enterprise innovation performance capabilities; at the same time, external uncertainty also has a significant role in promoting corporate social responsibility. When uncertainty in external economic policies rises, enterprises are more motivated to assume corresponding social responsibilities, more motivated to innovate and upgrade, and achieve improvements in production efficiency. Huo et al. (2020) researched the moderating mechanism of corporate financialization, external uncertainty, and enterprise innovation, it is noted that the intensification of uncertainty shocks has the potential to significantly and effectively stimulate enterprise innovation, and enterprise financialization acts as a moderating factor in the process by which uncertainty influences enterprise innovation.

### 2.3. Concept of dual circulation development in enterprise

Currently, the notion of dual-circulation development is mainly defined by scholars from both micro and macro perspectives. From a macro perspective, Sun et al. (2021) argue that the new dual-circulation development paradigm essentially reflects and demands China's economic growth momentum in the new era, focusing on the interconnectedness between import-export trade, investment, and consumption, as well as their relationship with China's economic growth momentum. Microscopically, Tang et al. (2020) proceed from the product market, domestic circulation can be understood as providing products and services to the domestic market and using domestic production factors for the daily business activities of enterprises. Similarly, external circulation involves providing products and services to foreign markets and utilizing foreign production factors for the production and sales activities of enterprises. Li (2021) briefly defines the connotation of dual circulation, stating that domestic circulation pertains to the economic system in which the entire production process is carried out and completed within a sovereign country, international circulation, on the other hand, denotes the economic system where the domestic production process is dependent on foreign raw materials, manufacturing processes abroad, or consumer markets outside the country. The production efficiency of enterprises is mainly the study of its influencing factors. Studies have shown that export rebates, digital transformation, and directors with overseas backgrounds are all important factors that affect enterprise production efficiency. In particular, the "learning-by-exporting" hypothesis suggests that when developing country enterprises engaging in the worldwide market for exports, they can access and acquire knowledge and insights from the most advanced manufacturing practices, technology research and development processes, as well as management methodologies employed by developed countries, thus promoting an increase in production efficiency in developing countries (De Loecker, 2007). Wang et al. (2016) combined DEA with multiple regression and found that enterprise technology and scale efficiency have an active moderating impact on enterprise internationalization and enterprise performance. Therefore, we consider using the degree of enterprise internationalization and external economic policy uncertainty as interactive moderating variables to explore their impact on enterprise total factor productivity.

In addition, the business environment is frequently regarded as a significant factor that impacts enterprises production efficiency. When environmental uncertainty increases, external investors and stakeholders become more cautious in making decisions based on the information they receive, and decision-makers behaviors also shift from aggressive to conservative, reducing the adverse consequences of overpayment and difficulty in achieving synergies (Lin et al., 2015). By controlling business risks, enterprises can lighten the adverse impacts of environmental uncertainty. The increase in uncertainty surrounding the environment makes it difficult for enterprises to accurately grasp market conditions, which may lead to problems of over-investment or under-investment during the investment process, thereby reducing investment efficiency and internal resource allocation efficiency (Shen et al., 2012). Liu et al. (2023) studied the influence of the business environment on enterprise overall factor productivity. The results show that enterprise productivity can be improved by improving the business environment. Therefore, we consider using the business environment as an intermediary variable.

In summary, we can preliminarily conclude that global uncertainty in economic policies may have a potential influence on enterprise total factor productivity through the dual-circulation paradigm. This study endeavors to elucidate the theoretical underpinnings of how policy uncertainty impacts the production efficiency of listed enterprises, employing empirical analyses to delve into the intricate relationship between economic policy uncertainty and corporate productivity.

In comparison to the existing literature, this article presents the following innovations:

Under the influence of trade protectionism, geopolitical conflicts and other factors, policy uncertainty is rising, and the world economy, especially the economy of developing countries, is seriously negatively affected. In recent years, China has actively participated in globalization and promoted global economic development based on its factor endowments. When facing global economic policy uncertainty, research by Li et al. (2021) found that the financial misallocation caused by the information asymmetry of banks and enterprises may lead to the decline of total factor productivity. However, this article studies this problem from the angle of corporate internal governance. Within the framework of the dual circulation strategy, when faced with uncertainty, enterprises proactively adjust their operational risks and overseas business scales to mitigate risks, thereby enhancing their total factor productivity. By combining the practical issues of economic development, studying the effect of increased global uncertainty in economic policies on the production efficiency of Chinese enterprises holds representative significance for developing countries in formulating policies to address external shocks.

In response to the Chinese government's requirement in 2020 to "build a new progress paradigm with domestic and international circulations reinforcing each other," starting from the double cycle, this article also analyzes the effect of external economic policy fluctuation on the production efficiency of enterprises. This approach provides a better assessment of the moderating effect of new development patterns on external economic policy fluctuations. Using global economic policy uncertainty as a metric, this article demonstrates the influence of external economic policy fluctuations on the high-quality progress of enterprises from a broader and more realistic perspective. Economic policy adjustments inevitably affect corporate performance, especially for listed enterprises, where external changes can significantly impact operations. Compared to the study by Li et al. (2021), which focused on the uncertainty index of global economic policy is used to analyze the uncertainty of domestic economic policy. This metric is expected to exert a greater influence on enterprise operational risks and the scales of overseas businesses. Considering the proactive internal governance behaviors of enterprises, this paper opts for global economic uncertainty as its research focus.

### **3. Empirical research design**

#### **3.1. Sample and data sources**

This study takes listed enterprises in Shanghai and Shenzhen Stock Exchange as research samples, and the period is 2000–2020, excluding those in the real estate and financial sectors, as well as those listed in or after 2015. Listed enterprises are chosen because they serve as the primary representatives of a country's businesses. They are the backbone of China's international competitiveness, and their production efficiency is a characteristic index of a

country's productivity growth. Long-term data and in-depth analysis of publicly available information are considered more reliable. Furthermore, in the context of the dual-circulation international background, listed enterprises have the highest degree of international advancement and are significantly influenced by external environments. Therefore, they are more suitable for studying the influence of external economic policy fluctuations on high-quality corporate advancement.

Financial enterprises are excluded because their financial indicators differ from those of regular enterprises, even their accounting standards and regulatory policies are unique. The real estate industry has financial-like attributes, and its asset structure and business model differ significantly from typical production-oriented enterprises, thus justifying their exclusion. Additionally, the 2015 crash in China Stock Markets affected the investment and financing of listed enterprises, severely impeding their direct financing channels. Therefore, listed enterprises from 2015 onwards are excluded. So as to cut down the effects of extreme values on regression consequences, this study applies a 5% winsorization treatment to all variables used. Data for this study derives from the Wind Economic Database (n.d.), National Bureau of Statistics of China (n.d.) and the Economic Policy Uncertainty Index (n.d.) website.

## 3.2. Variable definition

### 3.2.1. Total factor productivity (TFP)

In this article, the *TFP* and labor productivity of enterprises are mainly selected to represent enterprises productivity. *TFP* is an all-sided concept of enterprise technology upgrading, enhancement of management mode, product quality promotion, and enterprise structure optimization. Considering the large sample size and large span selected in this paper, the sample size is still enough even if the sample with zero investment is deleted. Therefore, the article selects the OP method to calculate TFP. According to Lu (2012), we made this Equation:

$$FP = \ln Y - \beta_k \ln K - \beta_l \ln L, \quad (1)$$

where  $\ln Y$  is the napierian logarithm applied to the enterprise's main business income, and  $\ln L$  and  $\ln K$  are the natural logarithms of employee count and the enterprise's fixed assets, respectively.  $\beta_k$  is capital's elasticity of output and  $\beta_l$  is the output resilience of labor. Equation (1) is calculated by OP methods.

### 3.2.2. Labor productivity (LaborProd)

This article uses the way of Brandt et al. (2012) and Martino (2015) to measure labor productivity by the unit labor output of enterprises. To quantify an enterprise's unit output, we divide its added value by the average workforce count over a given period. The added value encompasses the cumulative depreciation of fixed assets, labor compensation, net production taxes, and operating profits. This average workforce count is derived by averaging the employee headcount at the start and end of the period. Staff salaries, meanwhile, are calculated based on the current period's salary increments and cash remuneration paid to employees. The depreciation of fixed assets is calculated by multiplying the depreciation rate by the operational number of fixed assets recorded in the balance sheet. Net production tax refers to business tax and surcharges, including VAT on the business income statement.

### 3.2.3. External economic policy fluctuations (Gepu)

Firstly, the Global Economic Policy Uncertainty Index extracted from expert forecasting reports, articles, newspapers, and news by-text analysis method is used as the basis for measuring external economic policy fluctuations. Considering the index is founded on monthly data, and the variables used in this paper are annual data, we employ the geometric average approach to determining the average of monthly figures for 12 months in a year as annual data. With the same order of magnitude, the calculated annual data are divided by 100 to get the external economic policy fluctuation index.

### 3.2.4. Degree of internationalization of enterprises (International)

Since Chinese listed enterprises only disclose their overseas market revenue, we choose the proportion of overseas market revenue to total sales to represent the degree of internationalization.

### 3.2.5. Uncertainty of operating environment (EU)

Based on the research of Cheng and Kesner (1997), Ghosh and Olsen (2009), and Shen et al. (2012), this article selects the standard deviation of sales income adjusted by industry during the past five years as the proxy variable to measure environmental uncertainty. The specific operation is as follows: first, we select the revenue from sales data of each enterprise in the last five years, and use Ordinary least squares (OLS) regression through the Equation (2):

$$\text{Sales} = \alpha_0 + \alpha_1 \text{Year} + \varepsilon. \quad (2)$$

Since this paper studies the uncertainty of the operating environment, Equation (2) excludes the part of the steady growth of the business income in the past five years, and takes the regression disturbance as the abnormal sales income in the last five years, derived from the average of the past five years revenue. To assess the unadjusted operational environment uncertainty, we establish a benchmark by calculating the median of environmental non-determinacy across all enterprises within the same industry, disregarding any business-specific adjustments. Subsequently, we normalize this value by dividing it by the industry-wide environmental uncertainty without industry-specific adjustments, resulting in the industry-adjusted Environmental Uncertainty (EU) metric.

### 3.2.6. Scale of overseas business (Oversea)

This paper chooses the overseas business income disclosed by Chinese listed enterprises and uses the napierian logarithm as a proxy to assess the scale of overseas operations.

### 3.2.7. Other control variables

To further alleviate the problem of endogenous interference such as missing variable bias, according to the study of Peng et al. (2018) and Liu et al. (2019), we introduce other factors that may affect enterprises' productivity as restraining variables: the natural log of fixed assets (FA), the degree of enterprise market competition (EXP), the growth ability of enterprises (TQ), the net profit growth rate (TP) and the operating cash flow (FCF). The specific meaning and calculation of the above variables are shown in Table 1 below, and descriptive statistics of the variables are shown in Table 2 below.



**Table 1.** Definitions and measurements of variables

Variables	Definition		Measurement
TFP	Total Factor Productivity	Agent variable of enterprise productivity	Calculating with the command OP
LaborProd	Labor productivity		The output per unit of the labor force of enterprises
Gepu	Fluctuations in external economic policy		The monthly index of global economic policy uncertainty, averaged geometrically
International	Degree of enterprise internationalization		Enterprise overseas market sales revenue/enterprise total sales revenue
EU	The uncertainty of enterprise operating environment		Industry-adjusted standard deviation of sales proceeds over the last 5 years
Oversea	The scale of overseas business		The natural logarithm of revenue from overseas operations
FA	Enterprise fixed assets		The natural logarithm of fixed assets
EXP	Degree of enterprise market competition		Enterprise sales income/Revenue
TP	Net profit growth rate		The total profit is logarithmic and uses the first-order difference
TQ	The potential for enterprise expansion		The debt-to-asset ratio, expressed as the sum of liabilities' book value divided by the total assets' book value
FCF	Operating cash flow		(Cash received from selling goods and providing services)/total assets

**Table 2.** Descriptive statistics for major variables (source: authors' calculation)

Variables	Definition	Sample	Mean value	Standard deviation	Minimum value	Maximum value
TFP	Total Factor Productivity	48951	18.9390	1.2283	17.003	22.3600
LaborProd	Labor productivity	48951	13.3160	0.6940	12.3260	15.5480
Gepu	Fluctuations in external economic policy	48951	4.9753	0.2551	4.6562	5.5359
International	Degree of enterprise internationalization	48951	0.2763	0.3053	0.0033	14.7130
EU	The uncertainty of enterprise operating environment	48951	2.1675	4.1232	0.4147	28.5070
Oversea	The scale of overseas business	48951	19.2230	2.0598	15.1710	24.0980
FA	Enterprise fixed assets	48951	20.2170	1.5990	17.3800	24.4490
EXP	Degree of enterprise market competition	48951	0.5660	1.8683	0.0058	13.7090
TP	Net profit growth rate	48951	0.1409	0.6290	-0.9673	2.4322
TQ	Enterprise growth capacity	48951	4.7792	2.3294	0.9933	14.2830
FCF	Operating cash flow	48951	0.0507	0.0689	-0.0757	0.2641

Note: CSMAR (n.d.) and Wind Economic Database (n.d.), National Bureau of Statistics of China (n.d.), Economic Policy Uncertainty Index (n.d.) website.

### 3.3. Models

To examine the external economic policy fluctuation influence on enterprises' productivity, set the following econometric Equation (3) and make OLS regression.

$$TFP_{it} = \alpha_0 + \alpha_1 Gepu_{it} + \alpha_2 FA_{it} + \alpha_3 EXP_{it} + \alpha_4 TP_{it} + \alpha_5 TQ_{it} + \alpha_6 FCF_{it} + \theta_i + Industry \times Year + \mu_{it}. \quad (3)$$

In Equation (3), TFP is the explanatory variable, Gepu is the explained variable, and the control variables are FA, EXP, TP, TQ and FC. The subscript  $i$  and  $t$  represent enterprise and year, respectively.  $\theta_i$  indicates enterprises' fixed effect,  $Industry \times Year$  is the joint fixed effect of industry and year, and  $\mu_{it}$  is the random error term. The reason why the time-fixed effect is not controlled in the model is that Gepu is a time series variable. All standard errors divided into groups by industry.

Considering the potential endogeneity issues in the model, there are several commonly used methods to address them: instrumental variable method (IV), fixed effects way, Heckman two-step method, PSM model, regression discontinuity design, and difference-in-differences (DID), among others. The instrumental variable method further includes 2SLS model and a GMM model. All of these are standard approaches to tackle endogeneity. Ordinary least-squares regression models cannot account for unobserved heterogeneity, whereas fixed-effects or random-effects models can.

In this paper, the GMM model is employed to control for endogeneity, which arises from three main sources: (1) unobserved heterogeneity, (2) simultaneity, and (3) dynamic endogeneity. GMM models can transform the data and incorporate the lag values of explanatory variables to manage endogeneity. Furthermore, the dynamic panel data GMM model expands upon the fixed effects model by utilizing lagged values of the explanatory variable as a means to command for dynamic endogeneity, alongside the internal transformation process. By using the system GMM, we are able to obtain accurate estimates while dealing with unobserved heterogeneity and dynamic interactions between the present value of the explanatory variable and the past value of the explanatory variable.

$$\begin{aligned} TFP_{it} = & \beta_0 + \beta_1 TFP_{i,t-1} + \beta_2 Gepu_{i,t} + \beta_3 FA_{it} + \beta_4 EXP_{it} + \beta_5 TP_{it} + \\ & \beta_6 TQ_{it} + \beta_7 FCF_{it} + \theta_i + Industry \times Year + \mu_{it}. \end{aligned} \quad (4)$$

Based on Equation (3), we introduce an interactive term between the Gepu and the International to analyze the moderating influence of the enterprises' internationalization degree in the course of the fluctuation of external economic policy affecting enterprise productivity, then we get the Equations (5) and (6).

$$\begin{aligned} TFP_{it} = & \varphi_0 + \varphi_1 Gepu_{i,t} + \varphi_2 Gepu_{i,t} \times International_{it} + \varphi_3 International_{it} + \\ & \varphi_4 EXP_{it} + \varphi_5 TP_{it} + \varphi_6 TQ_{it} + \varphi_7 FCF_{it} + \theta_i + Industry \times Year + \mu_{it}; \end{aligned} \quad (5)$$

$$\begin{aligned} TFP_{it} = & \omega_0 + \omega_1 TFP_{i,t-1} + \omega_2 Gepu_{i,t} + \omega_3 Gepu_{i,t} \times International_{it} + \omega_4 International_{it} + \\ & \omega_5 EXP_{it} + \omega_6 TP_{it} + \omega_7 TQ_{it} + \omega_8 FCF_{it} + \theta_i + Industry \times Year + \mu_{it}. \end{aligned} \quad (6)$$

Lastly, combined with China's dual circulation policy, we study the intermediary effect of uncertainty of the operating environment and overseas business income in the process of external economic policy fluctuation affecting enterprise productivity. We divide the sample

of enterprises into two parts, that is, export enterprises and non-export enterprises, according to whether they have an overseas business or not. Then enterprises without overseas business income are set to only participate in domestic internal circulation; conversely, enterprises with overseas business scale are set to participate in the dual circulation enterprises. We study the intermediary role of the uncertainty of the operating environment in enterprises participating in internal circulation, and the enterprise overseas business income channel in the dual circulation. This paper uses the method of intermediary effect and builds the following Equations (7) and (8) based on the above analysis of enterprise productivity.

$$\begin{cases} TFP_{it} = \delta_1 + \delta_2 Gepu_{i,t} + \delta_3 X_{i,t} + \theta_i + Industry \times Year + \mu_{it} \\ EU_{it} = \varepsilon_1 + \varepsilon_2 Gepu_{i,t} + \varepsilon_3 X_{i,t} + \theta_i + Industry \times Year + \mu_{it} \\ TFP_{it} = \sigma_1 + \sigma_2 Gepu_{i,t} + \sigma_3 EU_{i,t} + \sigma_4 X_{i,t} + \theta_i + Industry \times Year + \mu_{it} \end{cases} ; \quad (7)$$

$$\begin{cases} TFP_{it} = \delta'_1 + \delta'_2 Gepu_{i,t} + \delta'_3 X_{i,t} + \theta_i + Industry \times Year + \mu_{it} \\ Oversea_{it} = \varepsilon'_1 + \varepsilon'_2 Gepu_{i,t} + \varepsilon'_3 X_{i,t} + \theta_i + Industry \times Year + \mu_{it} \\ TFP_{it} = \sigma'_1 + \sigma'_2 Gepu_{i,t} + \sigma'_3 Oversea_{i,t} + \sigma'_4 X_{i,t} + \theta_i + Industry \times Year + \mu_{it} \end{cases} . \quad (8)$$

In Equations (7) and (8),  $\delta_1$ ,  $\varepsilon_1$ ,  $\sigma_1$ ,  $\delta'_1$ ,  $\varepsilon'_1$ ,  $\sigma'_1$  all represent constant terms and  $X_{it}$  represents control variables in the paper, control variables including EXP, TP, TQ, and FCF.  $EU_{it}$  and  $Oversea_{it}$  are the mediating variables.  $EU_{it}$  represents the uncertainty of the business environment.  $Oversea_{it}$  represents the scale of an enterprise's overseas business.  $TFP_{it}$ ,  $Gepu_{it}$  and  $Industry \times Year$  are consistent with Equation (3).

## 4. Empirical estimation and results

Based on the empirical analysis and robustness test identified by the regression model, firstly, we test the influence of external economic policy fluctuations on enterprise productivity. Secondly, to analyze the moderating effect of internationalization degree on enterprise productivity affected by external economic policy fluctuations, the interaction term between external economic strategy fluctuations and enterprise internationalization degree is added. Thirdly, this article analyzes the intermediary influence of environmental uncertainty and the scale of overseas business according to the sub-sample of enterprises that participated in the economy's internal circulation and dual circulation respectively.

### 4.1. Estimation of the base model

Table 3 comprehensively outlines the impact of Gepu on enterprise productivity, encompassing various estimation methodologies: the fixed effects model, the instrumental variable approach utilizing IV-GMM, the dynamic panel analysis through the DIF-GMM, and SYS-GMM estimation technique, respectively. This comprehensive examination provides insights into the multifaceted effects of Gepu on productivity within the enterprise context. As shown in Column (1) of Table 3, Gepu is at 1% level, and is positively correlated with TFP. It indicates the aggravation of external economic policy fluctuation can elevate the improvement of enterprises' productivity.

**Table 3.** Influence of Gepu on TFP

Equation	(1)	(2)	(3)	(4)
Variable	FE	IV-GMM	DIF-GMM	SYS-GMM
L.TFP			0.6810*** (0.1390)	0.8740*** (0.0194)
Gepu	1.0540*** (0.3720)	0.3520*** (0.0209)	0.1460* (0.0812)	0.0768*** (0.0142)
FA	0.1930*** (0.0049)	0.4350*** (0.0043)	0.0277* (0.0160)	0.0505*** (0.0085)
EXP	0.0264*** (0.0031)	0.0958*** (0.0033)	0.0078 (0.0049)	0.0114*** (0.0023)
TP	0.0622*** (0.0046)	0.1340*** (0.0103)	0.1470*** (0.0152)	0.1840*** (0.0074)
TQ	-0.0139*** (0.0003)	-0.0066*** (0.0004)	-0.0127*** (0.0019)	-0.00163*** (0.0003)
FCF	0.5210*** (0.0488)	-0.5210*** (0.0915)	0.2900*** (0.0715)	0.1350** (0.0543)
Enterprise fixed effect	Yes	Yes	Yes	Yes
Industry×Year joint effect	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		9.7E+05		
10% critical value of Stock-Yogo		16.38		
AR(2)			-0.3800 [0.7040]	-0.4880 [0.6260]
Sargan			13.9600 [0.6020]	14.4300 [0.6370]
Hansen			14.4600 [0.5650]	15.1700 [0.5830]
N	48951	48951	46966	48146

Note: Standard errors in parentheses and p-value in brackets. \*\*\*, \*\* and \* represent significance levels of 1%, 5% and 10%, respectively. The same below.

Among the remaining explanatory variables, with the exception of TQ, FA, EXP, TP, and FCF exhibit positive effects on enterprise productivity. The enhancement in fixed assets, sales expenses, total profits, and cash flow serves as an indication that the improvement in enterprises' operating performance, profitability, and future prospects encourages them to actively pursue industrial chain expansion and seize opportunities for product upgrades. Then that can further improve product quality, reduce production cost, add profit, build up the confidence to upgrade, and promote enterprise innovation and sustainable development.

For enterprises, the ultimate effect of technological upgrading will be reflected in the enhance of labor productivity, converting existing capital and labor factors into more output. Thus, this article chooses labor productivity as the independent variable to further test the influence of external economic policy fluctuations on enterprise productivity. The regression consequences are in Table 4 below:

**Table 4.** The impact of external economic policy fluctuations on labor productivity

Equation	(1)	(2)	(3)	(4)
Variable	FE	IV-GMM	DIF-GMM	SYS-GMM
L.Labor			0.3880* (0.2140)	0.8350*** (0.0531)
Gepu	1.2180*** (0.1610)	0.4720*** (0.0201)	0.3100*** (0.1050)	0.0585** (0.0227)
FA	-0.0266*** (0.0049)	0.1050*** (0.0045)	-0.0127 (0.0200)	0.0174*** (0.0053)
EXP	0.0078*** (0.0028)	0.0202*** (0.0035)	0.0008 (0.0055)	0.0010 (0.0050)
TP	0.0775*** (0.0036)	0.0858*** (0.0094)	0.1120*** (0.0195)	0.1630*** (0.0080)
TQ	-0.0045*** (0.0005)	-0.0058*** (0.0006)	0.0052* (0.0028)	0.0052*** (0.0015)
FCF	0.3780*** (0.0442)	0.6490*** (0.0902)	0.1510* (0.0779)	0.1740*** (0.0652)
Enterprise fixed effect	Yes	Yes	Yes	Yes
Industry × Year joint effect	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		6.5E+05		
10% critical value of Stock-Yogo		16.38		
AR(2)			0.9270 [0.3540]	1.4270 [0.1540]
Sargan			9.3950 [0.0520]	2.9380 [0.7100]
Hansen			8.9120 [0.0633]	3.0640 [0.6900]
N	48951	48951	46966	48146

As Table 4 reports, when labor productivity is taken as the explained variable, the values of the coefficients Gepu are all active under the method of estimation of the fixed effect model, instrumental variable regression, DIF-GMM, and SYS-GMM, which are deemed significant at the 1% and 5% significance levels, respectively. Under the four estimation methods, the results show that the external economic policy fluctuation has an active influence on the labor productivity of enterprises.

## 4.2. Endogeneity test

### 4.2.1. Test of instrument variable

Based on static panel FE, this paper uses IV-GMM to test the model in consideration of possible endogenous problems. Referring to the practice of Peng et al. (2018), this paper calculates the weighted mean of economic policy uncertainty index weighted by China's total import and export to other 20 countries except for China, which is used as the instrument variable of external economic policy fluctuation. Since the construction of the global economic policy

uncertainty index includes 21 countries including China, and it is hard for the economic policy uncertainty of other countries except China to directly cause the behavior change of Chinese enterprises, it is reasonable to prove the rationality of this instrument variable. To further prove the rationality of the instrument variable, a weak instrument variable test is used. In Table 3 and Table 4, we can find from columns (3) and (4) that the value of the Cragg-Donald Wald F statistic is more than the 10% critical value of 16.38 of Stock-Yogo weak recognition test, manifesting that there is no weak instrument variable and the instrument variable is valid; also we can see that the result of IV-GMM regression is consistent with the consequence of fixed effect model, which means the increasing fluctuation of external economic policy can promote the enterprise productivity.

#### **4.2.2. Dynamic panel regression**

After testing the baseline results with instrumental variables, it is also estimated by the Dynamic panel DIF-GMM and SYS-GMM, which is shown in columns (3) and (4) of Table 3 and Table 4. Given that the fluctuation of external economic policy is time-sensitive and has a lasting influence on the productivity of enterprises, a first-order lagged term of the independent variable is added to the model. According to the consequences, it is evidence that the enterprises' productivity will be affected by its lag period, which also shows that the dynamic panel model can capture the impact between the preceding period and the following period more accurately, so the consequences of dynamic panel model are more valuable for reference. For Gepu, the consequences of the two estimation ways of the dynamic panel model both indicate that the intensification of external economic policy fluctuations can significantly increase enterprise productivity. The autocorrelation of second-order sequences also passed the 10% significance test, which proves that there was no autocorrelation of second-order sequences. Meanwhile, the Sagan test and Hansen test were employed to test the suitability of the selected instrument variable. The p-value passed the 10% significance level test, that is, the selection of the instrument variable was reasonable and the DIF-GMM and SYS-GMM models fit well; for the other explanatory variables, the consequences of the four estimation methods are the same. The above analysis shows that the fluctuation of external economic policies will enhance the productivity of enterprises and improve the development of enterprises.

#### **4.3. Robustness test**

Given that the Chinese enterprises selected in this paper would be affected by various policies in China during their development process, such as the reform of enterprise accounting standards in 2007, flat tax rate for Chinese and foreign enterprises and the adjustment of corporate income tax rates in 2008, and the supply-side structural reform in 2015, among other significant events. To guarantee the reliability of the consequences mentioned above, we constructed a new sample to test the regression results. The regression consequences are showed in Table 5.

In columns (1) and (2), we excluded the samples where events such as the reform of enterprise accounting standards, the flat tax rate for Chinese and foreign enterprises, and the adjustment of corporate income tax rates occurred before 2009 for testing. The consequences manifested that the Gepu coefficient was active at the 1% significance level.

In columns (3) and (4), the key industries targeted by the supply-side structural reform for capacity reduction were coal, steel, iron, and electrolytic aluminum. Therefore, we excluded these industries from the original sample. The results indicated that fluctuations in external economic policies still had a significant active influence on enterprise productivity. Therefore, the conclusion is relatively robust.

**Table 5.** Tests of robustness excluding various policy interventions

Variable	Exclude enterprise accounting standards reform, unification of tax rates, income tax reform		Exclude the impact of supply-side structural reform	
	(1)	(2)	(3)	(4)
	TFP	LaborProd	TFP	LaborProd
Gepu	1.6680*** (0.3430)	1.2330*** (0.2380)	0.9180*** (0.0355)	1.2180*** (0.2400)
FA	0.1890*** (0.0153)	-0.0391*** (0.0149)	0.1750*** (0.0151)	-0.0266* (0.0149)
EXP	0.0258*** (0.0085)	0.0059 (0.0048)	0.0282*** (0.0083)	0.0078* (0.0045)
TP	0.0631*** (0.0054)	0.0795*** (0.0050)	0.0643*** (0.0053)	0.0775*** (0.0048)
TQ	-0.0139*** (0.0013)	-0.0046*** (0.0013)	-0.0152*** (0.0014)	-0.0045*** (0.0013)
FCF	0.4980*** (0.0837)	0.3380*** (0.0655)	0.5420*** (0.0789)	0.3780*** (0.0644)
Enterprise fixed effect	Yes	Yes	Yes	Yes
Industry×Year joint effect	Yes	Yes	Yes	Yes
_cons	6.1780*** (1.9300)	7.4050*** (1.3100)	10.6000*** (0.2510)	7.2840*** (1.3240)
N	27972	27972	32235	32235

#### 4.4. Moderating effect test

In this Section, we introduce the interplay between external economic policy fluctuations and the degree of enterprise internationalization as a crucial interaction term for analysis. Static panel FE, dynamic panel DIF-GMM, and SYS-GMM methods are used for estimation and the consequences are reflected in Table 6. As in column (1), the fixed effect model estimates indicate that external economic policy fluctuations are significantly positive for Gepu and enterprise productivity, and the interaction coefficient between the fluctuation of external economic strategy and the enterprises' internationalization degree is also active at the level of 5%. The consequences shows that the enterprises' internationalization degree has a positive moderating effect.

**Table 6.** Moderating effect of enterprise internationalization degree

Variable	(1)	(2)	(3)
	FE	DIF-GMM	SYS-GMM
L.TFP		0.7890*** (0.2820)	0.9340*** (0.0235)
Gepu	0.2380*** (0.0275)	0.0595 (0.2620)	1.8370 (3.1850)
Gepu×International	0.0302** (0.0133)	0.0462** (0.0200)	0.0140* (0.0072)
International	-0.1640** (0.0667)	0.0111** (0.0048)	0.0903*** (0.0229)
EXP	0.0298*** (0.0081)	0.0105** (0.0050)	0.0301** (0.0149)
TP	0.0464*** (0.0067)	0.1400*** (0.0201)	0.1560*** (0.0121)
TQ	-0.0197*** (0.0023)	-0.0139*** (0.0040)	-0.0003 (0.0006)
FCF	0.3990*** (0.0959)	-0.1440 (0.1080)	-0.0700 (0.1710)
Enterprise fixed effect	Yes	Yes	Yes
Industry × Year joint effect	Yes	Yes	Yes
AR(2)		-0.6970 [0.4860]	0.1570 [0.8750]
Sargan		21.9500 [0.1090]	4.4720 [0.4840]
Hansen		19.5800 [0.1890]	4.7640 [0.4450]
N	48951	46966	48146

Columns (2) and (3) show the results of the dynamic panel first-order differential and system differential estimation methods, which are the same as the results of the FE static panel estimation and are significant at 5% and 10% respectively. This indicates that the enterprises' internationalization degree has an active moderating effect. The productivity of enterprises will also be significantly positively affected by the first-stage lag of productivity. However, in the fixed-effect model FE, the degree of internationalization has a negative relationship with productivity, which shows that the degree of internationalization restrains productivity. Because the fluctuation of external economic policy has the problems of lag and timeliness to the productivity of enterprises, the model may have endogenous problems, which affect the precision of the results. Thus, this article uses the dynamic panel first-order difference and the system difference estimation method to test it. The model passes the second-order sequence autocorrelation and the Sargan and Hansen tests for tool variable Settings. The final consequences show that the moderating influence of enterprise internationalization is significant to enterprise productivity, and the result is steady.



#### 4.5. Intermediary test of enterprise under the background of dual circulation

According to the analysis above, the fluctuation of external economic policy exhibits an active effect on the enterprises' productivity, and the higher the enterprises' internationalization degree, the greater the improvement effect. In the new dual circulation development paradigm, we further examine the channels through which the fluctuation of external economic policy affects the enterprises' behavior. The consequences are as follows in Table 7 and Table 8.

##### 4.5.1. The intermediary effect test of internal circulation

The sample used in Table 7 is the enterprises without revenues from overseas operations, indicating that enterprises only participate in the domestic economic circulation.

**Table 7.** The intermediary effect of internal circulation

Variable	(1)	(2)	(3)
	TFP	EU	TFP
Gepu	0.8610*** (0.1700)	0.1190* (0.0674)	0.3990*** (0.0251)
EU			0.0709*** (0.0115)
EXP	0.0208* (0.0126)	0.1090** (0.0500)	0.0188* (0.0109)
TP	0.0689*** (0.0085)	0.0117 (0.0265)	0.0661*** (0.0091)
TQ	-0.0181*** (0.0023)	-0.0117* (0.0062)	-0.0206*** (0.0029)
FCF	0.7130*** (0.1230)	0.4740 (0.3220)	0.6600*** (0.1410)
Enterprise fixed effect	Yes	Yes	Yes
Industry × Year joint effect	Yes	Yes	Yes
_cons	14.4300*** (0.9390)	0.9800*** (0.3230)	16.9600*** (0.1310)
N	48951	48951	48951
Sobel Z			3.4840*** [0.0005]

Column (1) manifests the effect of external economic policy fluctuations on the productivity of enterprises engaged solely in domestic circulation. The coefficient of external economic policy fluctuations is active at the significance level of 1%, manifesting that the intensification of external economic policy fluctuations can promote the improvement of enterprise productivity. In column (2), we can see the effect of Gepu on the EU, the coefficient of Gepu is active at the level of 10%. This shows that there is a significant positive relationship between the Gepu and the EU. The increase of Gepu will lead to the enhancement of the uncertainty of the business operation environment, because the fluctuation of external economic policy leads to the change in the domestic economic environment, and enterprises will face more uncertainty. In column (3), two core explanatory variables, the variables Gepu and EU are

added in this part. The coefficients are significant at the 1% level. According to Wen and Ye (2014) the intermediary effect test, it can be known that the EU of enterprises has a partial intermediary impact. Moreover, the direct transmission effect of the fluctuation of external economic policy on enterprises' productivity and the indirect transmission effect are both positive. Therefore, the increase of Gepu can enhance the improvement of enterprise productivity through the enterprises' operating environment uncertainty for those who only participate in internal circulation.

#### 4.5.2. The intermediary effect test of dual circulation

The data in Table 8 is from the sample of enterprises with revenues from overseas businesses, indicating their participation in the dual circulation of global economies. In the process of the external economic policy fluctuation influencing enterprises' productivity, the intermediary effect of the uncertain operating environment is not significant. This may be because, with the increase of Gepu, the impact on enterprises' overseas investment and overseas business development is most important and intense. Due to the drastic impact on the scale of overseas business, the channel of uncertain operating environment may not be obvious.

Table 8(4)–(6) is the intermediary effect test of enterprises' overseas business scale. The coefficient of external economic policy fluctuation and overseas business scale is still positive, which is at 1% level. It shows that the overseas business scale of the enterprises participating in the dual circulation has a partial intermediary in the course of Gepu affecting the enterprises' productivity. Furthermore, the direct transmission effect of external uncertainty

**Table 8.** The intermediary effect based on dual circulation enterprise

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	TFP	EU	TFP	TFP	Oversea	TFP
Gepu	0.7540*** (0.0255)	-0.1040 (0.1520)	0.7010*** (0.0285)	1.6750*** (0.0547)	-0.5690*** (0.0562)	0.2580*** (0.0274)
Oversea			0.0510*** (0.0055)			0.0423*** (0.0069)
EXP	0.0308*** (0.0086)	0.1880** (0.0912)	0.0176* (0.0094)	0.0306*** (0.0076)	0.0182*** (0.0065)	0.0285*** (0.0077)
TP	0.0552*** (0.0066)	0.0304 (0.041)	0.0534*** (0.0072)	0.0493*** (0.0064)	0.1530*** (0.0115)	0.0385*** (0.0064)
TQ	-0.0249*** (0.0025)	-0.0537*** (0.0154)	-0.0255*** (0.0034)	-0.0194*** (0.0021)	-0.0007 (0.0007)	-0.0196*** (0.0022)
FCF	0.4390*** (0.0960)	0.4640 (0.6300)	0.3010** (0.1210)	0.5080*** (0.0907)	-0.1080 (0.1030)	0.4320*** (0.09190)
Enterprise fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year joint effect	Yes	Yes	Yes	Yes	Yes	Yes
_cons	15.2100*** (0.1350)	2.9030*** (0.8010)	15.5600*** (0.1570)	10.1000*** (0.2980)	3.2220*** (0.3070)	17.9400*** (0.1470)
N	48951	48951	48951	48951	48951	48951
Sobel Z			1.0980 [0.2722]			-2.3120** [0.0208]

on enterprise productivity is opposite to the indirect transmission effect. Therefore, it can be considered that the overseas business scale of enterprises has a “cover-up effect” in the influence of the external economic strategy fluctuation on the enterprises’ productivity. But generally speaking, the fluctuation of external economic policy and the productivity of enterprises are still significantly positive, which can promote the enterprises’ productivity through the overseas business scale. In conclusion, in the case of dual circulation growth, the scale of enterprises’ overseas business has an intermediary impact on the course of Gepu manifesting the productivity of enterprises, while the uncertainty of the operating environment does not have the intermediary effect.

#### 4.5.3. Robustness test of the intermediary effect

To further verify the intermediary effect of business uncertainty and overseas business scale on the influence of Gepu on enterprise productivity, we adopt the Sobel test and Bootstrap test to test the robustness of the intermediary effect. The consequences are shown in Tables 7, 8 and 9.

For enterprises engaging in internal circulation, the Z-value of the Sobel test is significantly positive, while for enterprises engaging in dual circulation, it is not significant. The above shows that the intermediary impact of operational uncertainty for enterprises participating in internal circulation exists. The Z-value of the Sobel test is significantly negative for

**Table 9.** Robustness test of intermediary effects

Path	effect	Enterprises participating in the internal circulation				Enterprises participating in the dual circulation			
		Effect size coefficient	S.E.	95% confidence interval		Effect size coefficient	S.E.	95% confidence interval	
				lower limit	upper limit			lower limit	upper limit
Gepu→ EU→ Tfp-op	Direct	0.6195***	0.0313	0.5581	0.6809	0.3613	0.0392	0.2844	0.4382
	Indirect	0.0498***	0.0119	0.0264	0.0733	0.0247	0.0211	-0.0165	0.0660
Gepu→ Oversea→ Tfp-op	Direct					0.5333***	0.0264	0.4817	0.5850
	Indirect					-0.0028**	0.0011	-0.0049	-0.0006
Gepu→ EU→ Labor	Direct	0.5185***	0.0349	0.4499	0.5869	0.4498	0.0169	0.4166	0.4829
	Indirect	0.0015**	0.0006	0.0004	0.0043	0.0001	0.0003	-0.0006	0.0007
Gepu→ Oversea→ Labor	Direct					0.4858***	0.0216	0.4434	0.5282
	Indirect					-0.0020**	0.0011	-0.0042	-0.0003

Note 1: Bootstrap repeated sampling 500 times. Control variables were added to the analysis, and the fixed effect of enterprise as well as Industry×Year joint effect was also controlled.

Note 2: Since the core explanatory variable, global economic policy uncertainty, is an annual time series variable, controlling for the fixed effect of time alone would lead to complete multicollinearity in the regression model, making it impossible to estimate. Therefore, by adjusting for the joint fixed effect of “industry-year” rather than the fixed effect of year alone, we aim to minimize the impact of time-fixed effects while addressing potential issues of complete multicollinearity in the model.

the enterprises participating in the dual circulation, indicating that there is an intermediary effect of overseas business scale for enterprises participating in dual circulation. As can be seen from Table 9, when the explained variables are replaced and Bootstrap is repeated 500 times, a 95% confidence interval of the intermediary effect coefficient of operating uncertainty and the overseas business scale does not contain 0 either, showing that the intermediary impact is significant for internal circulation enterprises and dual circulation enterprises. For the transmission mechanism of operating uncertainty in the internal circulation enterprises, both the direct and indirect effects are significantly active, revealing that there is a partial intermediary effect of operating uncertainty on the influence of external economic policy fluctuations on enterprise productivity. For the transmission mechanism of overseas business scale in dual circulation enterprises, the direct effect is significantly active, while the indirect effect is negative. It shows that the scale of the overseas business has a “cover-up effect” on the effect of the fluctuation of external economic policies on the productivity of enterprises, which supports the test results based on the stepwise regression approach.

#### 4.6. Further mechanism analysis

In view of the various factors affecting the high-quality development of enterprises, we take advantage of the unpredictability of China’s economic policies and analyze the effect of external policy fluctuations on the high-quality growth of enterprises. The original data on the uncertainty of China’s economic policies used in this article is the Economic Policy Uncertainty Index created by Baker et al. (2015) through textual analysis of the South China Morning Post, which is released monthly. In terms of data processing, we refer to Li et al. (2022) and use the monthly data for December as the annual data for the year. Among them, the uncertainty of China’s economic policies is denoted as MEPU, and the interaction term between China’s economic policies and global economic policies is denoted as MGEP. This paper employs fixed-effects models, instrumental variable IV-GMM methods, dynamic panel DIF-GMM estimation methods, and SYS-GMM models estimating the effect of worldwide economic policy uncertainty, China’s economic policy uncertainty, and their interactions on the total factor productivity of enterprises. The consequences are presented in the table below. As shown in Table 10, the coefficient of economic policy uncertainty in China is significant at the level of 1%. This suggests that the uncertainty of external economic policies has a positive and significant influence on the high-quality development of enterprises, indicating that greater variations in external economic policies have the potential to substantially enhance the total factor productivity of enterprises.

However, in Table 11, it is noteworthy that regardless of whether it is global economic policy fluctuations or China’s economic policy fluctuations, their regression coefficients on the total factor productivity of enterprises are smaller than the interaction between the two. This indicates that when global economic uncertainty interacts with uncertainty in China’s economic policies, there is a risk amplification effect, resulting in a more significant active influence on the high-quality development of enterprises.

**Table 10.** Impact of Chinese economic policy uncertainty on total factor productivity of enterprises

	(1)	(2)	(3)	(4)
	FE	IV-GMM	DIF-GMM	SYS-GMM
L.tfp_op			0.6970*** (0.1110)	0.8910*** (0.0215)
MEPU	0.3380*** (0.0072)	0.2940*** (0.0169)	0.0652 (0.0435)	0.0224* (0.0120)
FA	0.2790*** (0.0052)	0.4710*** (0.0049)	0.0401** (0.0181)	0.0512*** (0.0102)
EXP	0.0264*** (0.0040)	0.0945*** (0.0048)	0.0058 (0.0051)	0.0103*** (0.0028)
TP	0.0530*** (0.0050)	0.1050*** (0.0108)	0.1240*** (0.0116)	0.1590*** (0.0077)
TQ	-0.0162*** (0.0004)	-0.0038*** (0.0004)	-0.0128*** (0.0019)	-0.0010*** (0.0002)
FCF	0.2480*** (0.0580)	-0.3870*** (0.1040)	0.1680** (0.0685)	0.0079 (0.0523)
_cons	11.6300*** (0.1020)	7.8700*** (0.1160)		0.9640*** (0.1740)
AR(2)			-0.1510 [0.8800]	-0.2170 [0.8280]
Sargan			7.6700 [0.9580]	14.3900 [0.6400]
Hansen			9.1730 [0.9060]	13.2700 [0.7180]
N	18973	18973	14987	18083

**Table 11.** The impact of global and Chinese economic policy uncertainty on the total factor productivity of enterprises

	(1)	(2)	(3)	(4)
	FE	IV-GMM	DIF-GMM	SYS-GMM
L.tfp_op			0.6970*** (0.1110)	0.8950*** (0.0216)
MGEPU	0.2610*** (0.0095)	0.2560*** (0.0305)		
Gepu	0.0397 (0.0316)	-0.1080 (0.1220)	0.0316 (0.0317)	0.7090*** (0.1030)
MEPU	0 (.)	0 (.)	0.0651 (0.0436)	-0.2090*** (0.0365)
FA	0.2710*** (0.0053)	0.4710*** (0.0049)	0.0401** (0.0181)	0.0489*** (0.0103)
EXP	0.0255*** (0.0040)	0.0944*** (0.0048)	0.0058 (0.0051)	0.0100*** (0.0028)
TP	0.0553*** (0.0050)	0.1060*** (0.0109)	0.1240*** (0.0116)	0.1610*** (0.0077)

End of Table 11

	(1)	(2)	(3)	(4)
	FE	IV-GMM	DIF-GMM	SYS-GMM
TQ	-0.0158*** (0.0004)	-0.0037*** (0.0004)	-0.0128*** (0.0019)	-0.0010*** (0.0002)
FCF	0.2870*** (0.0578)	-0.3720*** (0.1040)	0.1680** (0.0685)	0.0256 (0.0523)
_cons	10.6800*** (0.1270)	7.3250*** (0.3660)		-1.3580*** (0.3980)
AR(2)			-0.1510 [0.8800]	-0.2390 [0.8110]
Sargan			7.6700 [0.9580]	19.3800 [0.3070]
Hansen			9.1730 [0.9060]	15.3700 [0.5690]
N	18973	18973	14987	18083

## 5. Conclusions and policy implications

### 5.1. Conclusions

According to the empirical research which employed data from Chinese listed enterprises, here are the main conclusions: first, the increase of the fluctuation of the external economic policy can exacerbate the business risk of enterprises, resulting in enterprises reducing the input of production factors. In this case, enterprises could only improve their productivity through technological progress, such as, the enhancement of total factor productivity and labor productivity. Second, the promotion effect of external economic policy fluctuations on the productivity of enterprises is influenced by the enterprises' internationalization degree. The higher the enterprises' internationalization degree, the more external economic policy fluctuations can promote the growth of productivity of enterprises. Third, whether the enterprise has overseas business (internal circulation enterprise and dual circulation enterprise) will make the mechanisms of external economic policy fluctuations affecting the enterprise's productivity different. For enterprises with overseas business, that is, enterprises participating in dual circulation, the aggravation of external economic policy fluctuations will affect the scale of overseas business and improve the productivity of enterprises and for enterprises without overseas business, that is, only participating in the internal circulation, the increased fluctuation of external economic policies will promote enterprises to improve productivity and achieve sustainable development through affecting the internal operating environment of enterprises.

### 5.2. Policy implications

In consequence, we draw the following suggestions: facing the increasing fluctuation of external economic policy, enterprises in developing countries should improve their consciousness and strengthen their ability to deal with the crisis, change the external shock into their

development opportunity, adjust their development strategy in time, and realize the increase of productivity. For Chinese enterprises, with the improvement of their internationalization, the impact of external economic policy fluctuations will become stronger. They should take the initiative to grasp changes in global economic policy trends and promote the improvement of productivity.

Based on the dual circulation development in China, enterprises are supposed to realize the improvement of productivity. For enterprises only involved in internal circulation, when facing the impact of the uncertain operating environment, the enterprise should pay attention to operating conditions, realize scientific and technological innovation with the tide of information technology, actively build a domestic industry chain, contribute to the formation of a strong domestic market. Dual circulation enterprises, they should recognize the changes in the international situation and continue to embrace external connections at a high level, dock with the international market, and actively participate in the process of globalization.

For the Chinese government, fluctuations in external economic policies can elevate the productivity of enterprises, and the government should reasonably control this effect. From a micro perspective, it is necessary to combine the status and conditions of Chinese enterprises, promote enterprise innovation and improve productivity, achieve sustainable development of enterprises, and enhance the international competitive ability of enterprises; from a broad viewpoint, to enhance the productivity of enterprises should be in line with China's current situations and social development level, avoid enterprises blindly interfered by external factors, balance the economic growth in quality and quantity, and achieve long-term sustainable economic growth.

## Funding

National Natural Science Foundation of China (72341014).

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