

Article

Economic Policy Uncertainty and Corporate Green Technology Innovation—Evidence from Privately Listed Companies in China

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Abstract: Green technology innovation (GTI) is an important way for enterprises to promote technological progress and enhance their market competitiveness. As investment in R and D and innovation is a high-risk, long-term investment project with high sensitivity to relevant policies, increases or drastic fluctuations in economic policy uncertainty (EPU) may have a strong impact on technological innovation. Therefore, it is necessary to examine how EPU affects GTI. In contrast to studies that have focused on the impacts of EPU on GTI in developed countries or state-owned firms in China, this study uses the mediating effect panel fixed effect model to investigate the impacts of EPU on corporate GTI and its mechanisms, based on data from China's Shanghai and Shenzhen A-share private manufacturing listed companies from 2013 to 2022. The results indicate that an increase in EPU has a positive impact on the GTI of private enterprises and that the impact is stronger in companies with multiple major shareholders, those purchasing directors' and officers' liability insurance, and those with stricter environmental regulations. This conclusion remains valid after robustness checks and instrumental variable tests. Mechanism tests reveal that the increase in EPU indirectly promotes GTI by forcing private enterprises to avoid short-sighted management tendencies, increase risk-taking levels, boost environmental protection investments, and strengthen internal controls. For example, EPU will lead to increased investment in green protection, meaning that private companies are more willing to promote green transformation and market competitiveness through innovative activities. These findings provide a reference for the Chinese government to formulate targeted environmental regulation policies and financing policies to guide the green transformation of businesses; they also provide insights for enterprises in other developing countries to cope with economic policy risks and promote green technological advancement.

Keywords: Chinese companies; economic policy uncertainty; green technology innovation; internal control



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1. Introduction

In April 2023, the International Monetary Fund released the “World Economic Outlook Report”, which pointed out that the potential impacts of three years of the pandemic, the ongoing Ukraine crisis, and the tightening of monetary policies by major world powers have led to uncertainties regarding the global economy, making it difficult for China to remain unaffected. Against the above background, the world's major countries are at-

tempting to promote green energy transformation and green development and to accumulate new international competitive advantages through green technology innovation (GTI). Green development refers to a new development model and ecological development concept that realizes sustainable scientific development through the protection of the natural environment under the constraints of ecological and environmental capacity and the carrying capacity of resources. Green development emphasizes the coordinated development of the economy, society, and the environment on the basis of the protection of the environment and resources, as well as the realization of ecological balance and sustainable development through environmental protection. The European Green Deal, proposed by the European Commission on 11 December 2019, set the goal of making Europe the first climate-neutral continent by 2050. In 2023, European Commission President Ursula von der Leyen formally proposed “The Green Deal Industrial Plan for the European Union”, which aims to improve the competitiveness of Europe’s net-zero industry and support Europe’s rapid transition to climate neutrality. This plan launches alliances and promotes industrial cooperation in areas such as batteries, raw materials, solar, hydrogen, and recycled plastics, among others. In east Asia, China has carried out a series of policy reforms, such as “Mt Carbon” and “Carbon Neutral”, from the perspective of promoting the sustainable development and high-quality development of enterprises. This series of government-led reforms also signifies an increase in external environmental uncertainty for businesses. In fact, GTI is becoming an important emerging field in new rounds of the global industrial revolution and in scientific and technological competition.

The topic of GTI has attracted the attention of a large number of scholars. GTI refers to innovative activities regarding technology or products in areas such as energy conservation, environmental protection, and resource recycling [1]. From a doctrinal point of view, GTI can foster clean production and reduce environmental costs, enabling enterprises to achieve sustainable development and bolster their competitive advantages [2]. Moreover, it positively influences overall economic green transformation [2]. Enterprises are the carriers of GTI, which is characterized by high risk, long investment cycles, and high sensitivity to economic policy uncertainty (EPU). EPU can be defined in various ways; however, it is broadly considered to denote the unanticipated changes affecting the economic system that could lead to changes in governmental policies [3]. EPU reflects the economic fluctuations associated with the unpredictability of fiscal, political, regulatory, and monetary policies [3–5]. In China, private enterprises account for 92.4% of companies and have played a crucial role in China’s economic development. At present, the GDP share of private enterprises exceeds 60%; their contributions to driving economic growth, creating jobs, leading innovation, and tax revenue are particularly notable. Therefore, the study of how EPU affects GTI in Chinese private firms constitutes an informative starting point.

This study aims to investigate the impacts of EPU on Chinese private enterprises and clarify the associated mechanisms. We found that an increase in EPU has a positive impact on the GTI of Chinese private enterprises; this impact is stronger in companies with multiple major shareholders and in companies purchasing directors’ and officers’ liability insurance. This means that the company or the company and the directors and senior management personnel jointly funded the purchase of insured directors and senior management personnel in the course of performing the company’s management duties, due to alleged negligence or misconduct (which does not include malicious intent, breach of duty of loyalty, disclosure of information in the intentionally false or misleading statements, or violation of the law), and be held personally liable for damages. The insurer shall be responsible for indemnifying the director or officer against legal costs incurred in defending against liability and reimbursing him/her on behalf of the civil liability he/she is liable for. The impact of an increase in EPU is also stronger in companies with stricter environmen-

tal regulations. Furthermore, an increase in EPU indirectly promotes GTI by forcing private enterprises to avoid short-sighted management tendencies, increase risk-taking levels, boost environmental protection investments, and strengthen internal controls.

Regarding EPU and corporate GTI, scholars are mainly divided into two categories. The first believes that EPU promotes relationships. These scholars believe that EPU stimulates enterprise research and development [6], thereby promoting GTI [2,7]. In fact, under such an environment, timely and pre-emptive innovation investments will give companies the ability to capitalize on further growth opportunities and gain a competitive advantage by preventing competitors from entering or by inducing them to make concessions. Other scholars have emphasized that strengthening GTI helps private enterprises to acquire the scarce resources essential for development [8,9] and reduce debt financing costs by actively assuming social responsibilities. For example, companies can gain a competitive edge, earn a good reputation, seek legitimacy, and obtain government support through green practices, such as energy conservation and emissions reduction, thus helping them to alleviate financing constraints and increase investment in GTI.

The second group of scholars views EPU as having an inhibitory effect. Some scholars believe that EPU has a negative influence on GTI [10] and that an increase in EPU causes firms to reduce investment, bond issuance, and spending [3], such that GTI—in the form of R and D spending and new product development—is stalled. For example, the irreversibility of investments and the rise in financing risk premiums can reduce corporate innovation inputs [11,12] and exacerbate the degree of information asymmetry in private enterprises, leading to higher financing costs and constraints [13]. Therefore, EPU can lead to a deterioration in cashflow stability for private enterprises.

These scholars have provided important insights for our research; however, there are also certain limitations and shortcomings. First, many studies have focused on analyzing the impacts of EPU on GTI in developed countries or Chinese state-owned enterprises (SOEs), virtually ignoring the examination of Chinese private firms. Notably, China is in a late stage of transition from a planned to a market economy and its national conditions differ from those of foreign countries. In fact, GTI is significant for China's sustainable development and, compared with developed countries, emerging markets require GTI for environmental protection [14]. Furthermore, in China, there are differences in the nature of ownership between private firms and SOEs, resulting in a certain degree of "discrimination" between the former and SOEs when it comes to external financing and innovation investment, with more reliance on internal financing to carry out innovation investment, while the latter has an easier time obtaining financing. The potential impacts of ownership differences on GTI by private enterprises has not been reasonably assessed and analyzed and needs to be explored in depth in the context of intensifying economic policy changes.

Second, scholars have often focused on separately analyzing EPU and GTI, mostly limiting their studies to the overall economy or non-private enterprises, making it difficult to theoretically guide private enterprises in leveraging policy risks to stimulate their GTI practices. Using data from China's Shanghai and Shenzhen A-share private manufacturing listed companies from 2013 to 2022, we found that an increase in EPU has a positive impact on the GTI of private enterprises that is better achieved by guiding the strategic innovation of private enterprises rather than substantive innovation. This suggests that, as EPU rises, Chinese private firms are responding to risk by engaging in more incremental technological innovation, having less incentive to engage in original innovation, perhaps as the latter requires more stable financial security.

Third, scholars have tended to study EPU and GTIs from the perspective of the regional environment, ignoring the important impacts of internal controls and the level of risk at the corporate management level. This study develops an explanation from

the perspectives of corporate decision-making and internal control—specifically, management myopia, risk-taking level, environmental investment, and internal control. The results reveal that an increase in EPU motivates Chinese private firms to avoid short-sightedness in management, strengthen their risk-taking level, increase environmental protection investments, and enhance internal control, thus promoting GTI. These mechanisms provide an important basis for understanding the rapid growth of China's green innovation dynamics.

In this study, we first put forward the theoretical hypotheses concerning EPU and GTI. Then, using data from Chinese private firms from 2013 to 2022, we tested the effect of EPU on GTI by using the fixed effect model. The results showed that EPU promotes private firms' GTI and that this effect is more obvious in firms with multiple major shareholders, those purchasing directors' and officers' liability insurance, and those with stricter environmental regulations. A further analysis using the mediated effects model indicated that rising EPU positively affects GTI by encouraging the managers of private firms to avoid short-sightedness, increase risk-taking, enhance environmental protection investment, and strengthen internal control.

2. Theoretical Analysis and Hypothesis Formulation

Economic policy is an important means by which the government shapes the external environment for businesses. EPU reflects the economy's fluctuations due to the unpredictability of fiscal, political, regulatory, and monetary policies [3–5]. EPU can be defined as frequent changes in economic policy, to the extent that economic agents cannot accurately predict whether, when, and in what direction the government will change economic policy [15]. Changes in economic policy can bring about shifts in macroeconomic outlooks, industry outlook expectations, and the external information environment, leading to changes in company behaviors [16]. In transitional economies, frequent government intervention in the market causes it to exhibit the characteristics of a “controlled market” [17]. Meanwhile, GTI refers to innovative activities regarding technology or products in areas such as energy conservation, environmental protection, and resource recycling [1]. As investment in R and D and innovation is a high-risk, long-term investment project with high sensitivity to relevant policies, increases or drastic fluctuations in EPU may have a strong impact on GTI.

EPU can promote GTI in private enterprises through “reputation”, “competitive advantage”, and “opportunity expectation” effects. First, we consider the reputation effect. Actively promoting GTI is in line with the concept of sustainable development promoted by the government, investors, and the media; therefore, if private enterprises strengthen their GTI, it can help them to obtain the important scarce resources needed for development [9]. For example, in a turbulent environment, private firms can improve their social image by actively assuming social responsibility, thus indirectly reducing the cost of debt financing. Second, we consider the competitive advantage effect. Carrying out GTI is conducive to energy saving and emissions reductions, thereby enhancing differentiated competitive advantages in the market, legitimacy, and government support, among other factors. Third, we consider the opportunity expectation effect. Although it may cause a decline in the market share and in the profitability of private enterprises, EPU may also have an incentive effect, prompting the management to adopt GTI to significantly save resources and energy and reduce environmental burdens, thus forming a new strategic competitive advantage and weakening the risk of capital losses brought about by the failure of GTI. For example, since 2019, Ant Group has been innovating and practicing GTI, focusing on offline mixed deployment, time-sharing scheduling, AI intelligent scaling, and

unified computing power, among other core technical challenges, and has applied these technologies to the company's Alipay and MYbank server clusters.

At the same time, EPU may negatively affect GTI. Increased EPU may inhibit GTI in private enterprises through channels such as innovation funding, environmental pollution externalities, and innovation risk. First, we consider innovation funding channels. During the economic transition period, private enterprises primarily rely on indirect financing. Due to institutional deficiencies and other factors, private enterprises suffer from "policy discrimination" in credit financing [18]. An increase in EPU directly affects the acquisition of innovation funds for enterprises and can even increase their financing costs [19]. For example, an increase in EPU can exacerbate the information asymmetry for private enterprises, resulting in higher financing costs and more significant financing constraints [13]. Refinancing difficulties will likely occur due to the "herding effect" of bank credit formation. The rise in EPU risk may also exacerbate the risk of decision-making errors, reducing expected returns and future cash flow stability [20], as well as affecting cash reserves. Second, we consider the external costs of environmental pollution. Private enterprises invest heavily in innovation, with long cycles and unstable returns. In a market environment with weak intellectual property protection, their innovative achievements can easily be imitated at low cost and copied by other companies, indirectly weakening their motivation or willingness to innovate [21]. In terms of economic decision-making, negative externalities will arise if private enterprises cannot enjoy all the benefits or are not required to bear the costs of pollution fully. Third, we consider the risk of innovation. An increase in EPU will raise the risk of innovation failure for private enterprises, prompting them to adopt more conservative investment strategies, thereby slowing down the innovation process. Private enterprises have a higher reliance on short-term debt compared to state-owned enterprises [22]. However, the long-term funding and cost of technological innovation require a particular environment and expectations. Therefore, an increase in EPU may negatively affect GTI.

Although different scholars have opposite views on EPU and GTI, we argue that EPU has a stronger positive than negative effect on GTI. The fact that China's GTI is growing rapidly demonstrates that there is a positive trend between EPU and GTI. Therefore, overall, we propose the following hypothesis:

Hypothesis 1. *EPU will have a positive impact on China's private manufacturing companies GTI.*

3. Research Design

3.1. Sample and Data

We selected privately owned manufacturing listed companies in China's Shanghai and Shenzhen A-shares as samples, covering the period from 2013 to 2022. Sample selection and processing were conducted as follows: (1) According to the "Catalogue of Industry Classification Management for Environmental Inspection of Listed Firms" issued by the Ministry of Ecology and Environment in 2008, environmentally sensitive listed companies in China's manufacturing industry were selected; (2) companies that were specially processed by the CSRC as "ST" or "PT" were excluded; and (3) companies that did not disclose social responsibility reports or which had missing data were also excluded. The final sample consisted of 12,176 items. To avoid the interference of individual extreme values on the estimation results, all continuous variables were subjected to 1% winsorization at both ends. The GTI data were obtained through calculations using the WIND, CSMAR, and CNRDS listed company databases.

3.2. Model and Variables

The panel data model was constructed to examine the transmission mechanism of EPU on GTI in private enterprises as follows:

$$GTI_{it} = \alpha_0 + \alpha_1 EPU_{jt} + \alpha CV_{it} + Year_t + Indu_k + \varepsilon_{it}, \quad (1)$$

where i , j , and t represent Chinese private manufacturing companies, the city where the listed company is located, and the year, respectively; and $Year_t$ and $Indu_k$ are year dummy variables and manufacturing industry fixed variables, respectively. The manufacturing industry was categorized into secondary classifications according to the 2012 revised “Guidelines for the Industry Classification of Listed Companies”, while others were classified as primary classifications. The handling of each variable was as follows:

- (1) *GTI*. The number of green patent applications can better reflect a company’s green innovation capability and product market performance. We define green technology innovation (GTI) as $GTI = \ln(\text{green inventions} + \text{green utility models} + \text{design patent applications} + 1)$;
- (2) *EPU*. The annual data on *EPU* were obtained by taking the arithmetic average of the monthly data from research paper [4]. To measure policy-related economic uncertainty, scholars constructed an index using three types of underlying components [4]. The first and most flexible component quantifies newspaper coverage of policy-related economic uncertainty. This newspaper-based approach is also used for the majority of other country- and topic-specific indices hosted on this site. For the United States, the newspaper-based component is an index of search results from 10 large newspapers. The newspapers included in our index are USA Today, the Miami Herald, the Chicago Tribune, the Washington Post, the Los Angeles Times, the Boston Globe, the San Francisco Chronicle, the Dallas Morning News, the New York Times, and the Wall Street Journal. From these papers, we constructed a normalized index of the volume of news articles discussing EPU. The second component of our policy-related uncertainty index draws on the Federal Reserve Bank of Philadelphia’s Survey of Professional Forecasters. Here, we utilized the dispersion between individual forecasters’ predictions about future levels of the Consumer Price Index, Federal Expenditures, and State and Local Expenditures to construct indices of uncertainty regarding policy-related macroeconomic variables. Data after 2013 were extrapolated using this method. As the original data were measured every month, in order to make these data consistent with the dimensions of other financial data, we converted the monthly *EPU* data into annual data using the arithmetic mean;
- (3) *CV*. Referring to the study by research paper [20], the following CVs were selected: asset size (Size); financial leverage (Lev); return on total assets (ROA); proportion of independent directors (Indep); duality of roles (Dual); whether there was a loss in the previous year (Loss); and major shareholder ownership (Top1). Table 1 presents the definitions for, and explanations of, each variable, while Table 2 presents the descriptive statistics.

Table 1. Variable definitions.

Type	Symbol	Name	Definition
Dependent variable	<i>GTI</i>	Green technology innovation	The application volume of (green invention + green utility model + design) plus 1, then take the natural logarithm.
Independent variable	<i>EPU</i>	Economic policy uncertainty	The China EPU Index developed by research paper [4].
Control variables	<i>Size</i>	Company size	Take the natural logarithm of the total assets of the enterprise.
	<i>Lev</i>	Financial leverage	(1) Total liabilities at the end of the period; (2) Total assets at the beginning of the period + Total assets at the end of the period
	<i>ROA</i>	Profitability	Net profit/total assets
	<i>Indep</i>	Proportion of independent directors	Number of independent directors/Number of board members
	<i>Dual</i>	Separation of duties	When the positions of Chairman and General Manager are combined, take 1; otherwise, take 0.
	<i>Loss</i>	The company's loss situation	If the previous year was in a loss state, take 1; otherwise, take 0.
	<i>Top1</i>	Major shareholder's equity	The shareholding ratio of the largest shareholder

Table 2. Descriptive statistics.

Variable	N	Mean	Std	Min	Media	Max
<i>GTI</i>	12,176	0.320	0.625	0	0	2.080
<i>EPU</i>	12,176	4.529	2.292	1.139	4.608	7.921
<i>Size</i>	12,176	21.89	1.009	19.59	21.78	26.48
<i>Lev</i>	12,176	0.364	0.175	0.046	0.355	0.912
<i>ROA</i>	12,176	0.053	0.067	−0.373	0.049	0.249
<i>Indep</i>	12,176	37.892	5.278	28.57	36.372	61
<i>Loss</i>	12,176	0.093	0.292	0	0	1
<i>Dual</i>	12,176	0.393	0.493	0	0	1
<i>Top1</i>	12,176	32.467	13.623	8.087	30.425	75.534

4. Empirical Results

4.1. Benchmark Results

Table 3 presents the benchmark estimation results. Column (1) shows the estimation results without including the control variables, in which the *EPU* coefficient is significantly positive. After gradually adding control variables in columns (2) and (3), the *EPU* coefficient remained significantly positive, indicating that an increase in *EPU* has a significant positive effect on the *GTI* of Chinese private enterprises, thus validating the proposed hypothesis. It is worth noting that the *EPU* coefficient in column (3) is slightly higher than that in column (2), suggesting that the magnitude of the effect of *EPU* on *GTI* is amplified by the inclusion of control variables. One possible reason for is that the *EPU* coefficients more truly reflect its marginal impact on *GTI* with the inclusion of control variables while, without them, some of the *EPU*'s marginal effects would be absorbed by the model's error term; thus, its coefficients are relatively small. In the control variables, the size of the enterprise is positively correlated with *GTI*. An increase in enterprise size brings cost savings, market power, and a higher cost markup rate, providing enterprises with an advantage

in innovation funding. The asset–liability ratio is positively correlated with the *GTI* of private enterprises, indicating that debt pressure plays a certain supervisory role, promotes the management’s risk-taking, alleviates their opportunistic risk aversion behavior, and promotes *GTI*. Comparing columns (2) and (3), it can be seen that *ROA*, *Loss* and *Dual* all contribute to *GTI*. This is because a rise in firms’ *ROA* is conducive to the provision of financial support for innovation and security for *GTI*, which is conducive to an increase in green technology output. The effects of *Loss* and *Dual*, though positive, are not significant. The former is because the enterprise in the current year compared with the previous year in the loss status will promote *GTI*, but the current year loss may be due to the current year’s investment in R and D funds, and the role of the funds on the promotion of *GTI* cannot thus be reflected in the short term. The latter may be because the system of the separation of powers between directors and management helps to alleviate the information asymmetry between directors and management, and thus promotes *GTI* due to the conflicting interests of different interest groups in different periods, such as short-term gains and long-term green innovation investment, which may affect the effect of the separation of powers. The effect of the size of the shareholding of the enterprise is not obvious, which implies that the equity of the enterprise’s owners is not significantly affected. The evenness of distribution does not affect *GTI*, because for major shareholders, increasing green innovation investment and promoting *GTI* is an important way to effectively deal with EDUs and enhance market competitiveness, which is consistent with the direction of increasing their interests. The effect *Indep* is not significant. Independent directors are not related to the profit and loss of the firm, but only carry out business analyses based on the overall business conditions of the firm, and therefore do not directly affect the *GTI* of the firm.

Table 3. Baseline model regression results.

Variable	(1)	(2)	(3)
<i>EPU</i>	0.018 *** (5.952)	0.019 ** (2.363)	0.021 ** (2.422)
<i>Size</i>		0.134 *** (8.122)	0.136 *** (8.126)
<i>Lev</i>		0.228 *** (3.832)	0.230 *** (3.934)
<i>ROA</i>		0.036 * (1.712)	0.037 * (1.725)
<i>Indep</i>		−0.001 (−0.493)	−0.001 (−0.484)
<i>Loss</i>		0.012 (0.374)	0.012 (0.372)
<i>Dual</i>		0.006 (0.314)	0.006 (0.315)
<i>Top1</i>		0.000 (0.258)	0.000 (0.256)
<i>Indu</i>	No	Yes	Yes
<i>Year</i>	No	Yes	Yes
Adj. R ²	0.005	0.152	0.151
N	12,176	12,176	12,176

Note: *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively; clustered robust standard errors at the company level are used for adjustment. The coefficient is within the T value. The same applies below.

4.2. Robustness Test

In order to test the robustness of the benchmark results and potential endogeneity issues, we adopted the following methods:

- (1) Change the measurement method. Regarding the measurement bias of *EPU*, we used the provincial-level changes in local officials (*RGO*) as a substitute variable for the external *EPU* faced by private enterprises, as this measurement method is suitable for China's specific circumstances. The promotion of officials in various regions of China is primarily based on economic growth as the main evaluation criterion; the *EPU* caused by the replacement of officials has far-reaching impacts [23]. Due to the unique context of political centralization in China (appointment of local officials, economic decentralization to local governments, and local economic policy systems), local government officials have gained control over resource allocation, affecting corporate decision-making. Different policy orientations create policy uncertainty in the external business environment of micro-enterprises which, in turn, affects the formulation and execution of corporate strategies. Therefore, a dummy variable for changes in officials was set, where a change in the secretary or mayor of a city in a given year was defined as a change in municipal government officials (taking a value of 1 if true and 0 if false). According to research paper [22], if an official takes office in the first half of the year, it is considered that there has been an official change in that region; if the newly appointed official takes office in the second half of the year, the following year is defined as the year of change. In Table 4, Column (1) shows that the *RGO* coefficient is 0.013 and significant, consistent with the benchmark test, indicating that the conclusions are not affected by the measurement bias of the core variables;
- (2) Omitted variables. To address the endogeneity caused by omitted variables, we used lagged values of *EPU* to replace the current ones. The error term of the previous period of the endogenous variable is not related to the error term of the current period. However, a relationship with the endogenous variable of the current period was observed. The results in Column (2) show that the *L.EPU* coefficient is significantly positive, indicating that the conclusions are robust and not affected by omitted variables;
- (3) Exclude low-carbon pilot samples. The low-carbon city pilot program is a policy initiative by the National Development and Reform Commission, requiring various regions to clarify their low-carbon development directions, accelerate low-carbon technologies and applications, establish a low-carbon target responsibility system, and promote a green, low-carbon lifestyle among residents. Low-carbon pilot cities can induce local enterprises to engage in green innovation behaviors, significantly enhancing the absolute and relative levels of corporate green innovation. To avoid interference with the research conclusions caused by including low-carbon pilot cities, we excluded the low-carbon pilot city samples. The results are shown in Column (3). From the analysis, it can be concluded that the main conclusions are not affected by the low-carbon pilot sample;
- (4) Instrumental variable method. We selected the U.S. *EPU* as an instrumental variable for 2SLS regression. This selection is justified for two reasons. First, as the two largest economies in the world, the U.S. and China engage in frequent trade activities, and trade data between the two countries naturally influence China's *EPU*. Additionally, the U.S. *EPU* affects the trade outcomes between the two countries, thus meeting the relevance requirement for an instrumental variable. Second, the U.S. *EPU* does not directly impact the first-stage regression results of Column (4), where the *EPU* coefficient is 3.532 and significant, indicating that the U.S. *EPU* has a strong explanatory power for the Chinese economic uncertainty index; in Column (5), the Cragg–Donald Wald F is greater than 10, indicating that the selected instrumental variables do not

have a weak instrument problem and that the *EPU* coefficient is significantly positive. After using the instrumental variable method, the impact of *EPU* on GTI remains consistent with previous findings, indicating that the conclusions are relatively reliable.

Table 4. Robustness test.

Variable	(1)	(2)	(3)	(4)		(5)
	Different EPU	Endogenous Variable Lagged One Period	Eliminate Low-Carbon Pilot Cities	Instrumental Variable Method		
				First Phase		Second Phase
<i>RGO</i>	0.013 ** (2.241)					
<i>EPU</i>			0.017 * (1.775)			0.057 ** (1.825)
<i>L.EPU</i>		0.012 ** (2.034)				
<i>Epu_usa</i> (IV)				3.532 *** (48.731)		
Cragg–Donald Wald F						1398.657 ***
Controls	Control	Control	Control	Control		Control
Indu and Year	Control	Control	Control	Control		Control
Adj_R ²	0.026	0.144	0.124	0.015		0.015
N	12,176	12,176	6253	12,176		12,176

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively; clustered robust standard errors at the company level are used for adjustment.

4.3. Mechanism Analysis

While the above analysis indicates that increased EPU will promote GTI in private enterprises, the underlying mechanisms were not analyzed. We sought to address this issue by considering the following factors: avoiding managerial myopia. The management myopia theory suggests that, in order to avoid the potential loss of wealth to shareholders, corporate managers are forced to reduce long-term investments that cannot be accurately valued by the market and do their best to increase the company's current earnings. An active market for corporate control, driven by the financial markets, is prone to overvaluing short-term performance and undervaluing risky long-term investments. In such a market centered on short-term profitability, managers who engage in long-term strategic investments expose themselves to significant employment risks. Thus, the threat of takeovers can contribute to the short-sighted behavior of managers of undervalued firms; enhancing risk-taking levels; increasing green investments; and strengthening internal controls. The analysis was considered as follows:

$$MV_{it} = \beta_0 + \beta_1 EPU_{jt} + \beta CV_{it} + Year_t + Indu_k + \delta_{it}, \quad (2)$$

$$GTI_{it} = \chi_0 + \chi_1 EPU_{jt} + \chi_2 MV_{jt} + \chi CV_{it} + Year_t + Indu_k + \xi_{it}, \quad (3)$$

where *MV* stands for mechanism variables, including avoiding managerial short-termism (*MMS*), enhancing risk-taking levels (*MRT*), increasing green investments (*IGI*), and strengthening internal controls (*STC*). The methods for constructing the four *MVs* and the corresponding estimation results are presented below.

- (1) *MMS*. *MMS* refers to the tendency of management to focus on immediate gratification and is an inherent, stable, personal trait and subconscious process [24]; however, it

can be partially influenced by environmental factors [25]. *EPU* can increase information volatility and ambiguity, prompting management to lean towards conservative investment decisions. However, it may also encourage management to mitigate their short-sighted tendencies by updating knowledge promptly, making proactive judgments, and seizing hidden opportunities, thereby increasing investment in *GTI*. We used the MD and A of annual reports from private enterprises as the measurement object. Through text analysis and machine learning methods, we identified a set of words related to the Chinese term “短期” (short term) to construct the *MMS*. Table 5, column (1) shows that the *EPU* coefficient is significantly negative. Column (2) indicates that both the *MMS* and *EPU* are significantly negative, suggesting that *EPU* promotes *GTI* in private enterprises by avoiding *MMS*;

Table 5. Intrinsic mechanism test.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Short-Sighted MANAGEMENT		Risk Bearing		Environmental Investment		Internal Control	
	<i>MMS</i>	<i>GTI</i>	<i>MRT</i>	<i>GTI</i>	<i>IGI</i>	<i>GTI</i>	<i>STC</i>	<i>GTI</i>
<i>MMS</i>		−11.903 ** (−2.018)						
<i>MRT</i>				0.283 ** (1.972)				
<i>IGI</i>						0.102 * (1.824)		
<i>STC</i>								0.012 ** (2.423)
<i>EPU</i>	−0.003 *** (−13.787)	−0.741 ** (−2.494)	0.002 *** (2.933)	0.016 *** (2.873)	0.816 *** (17.452)	0.023 * (1.689)	0.711 * (1.737)	0.018 *** (2.723)
Controls	Control	Control	Control	Control	Control	Control	Control	Control
Indu and Year	Control	Control	Control	Control	Control	Control	Control	Control
Adj_R ²	0.113	0.148	0.521	0.145	0.389	0.137	0.076	0.132
N	12,176	12,176	11,640	11,640	12,176	12,176	12,176	12,176

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively; clustered robust standard errors at the company level are used for adjustment.

- (2) *MRT*. Macroeconomic environmental uncertainty is an important factor influencing corporate decision-making behaviors [26]. Environmental uncertainty leads to deterioration in the external financing environment for enterprises, severe fluctuations in product market prices, and a decline in enterprises’ future expectations [27]. *EPU* increases the risk of uncertainty in the future returns of investment projects. Due to “principal-agency” issues and considerations of private benefits, managers—in a state of psychological defense—will lower their risk-taking levels. In the principal–agent relationship, due to the different objective functions of the principal and the agent, the principals (corporate shareholders) pursue their own interests to be greater, while the agents (management) pursue their own payroll and short-term gains. When the *EPU* rises, the agent first considers avoiding the investment risk, and thus reduces investment in innovation. As such, the investment return will decline, thus contradicting the shareholders’ objectives, which may ultimately harm the interests of the principals. They would rather abandon projects with a positive net present value but a high

risk. However, high returns are inevitably accompanied by high risks. Suppose the management wants to enhance the company's dynamic environmental adaptability through strategic changes such as *GTI*. In that case, the management must overcome the tendency to avoid risks, tolerate the failure of *GTI*, and bear the performance pressure caused by performance fluctuations. Therefore, we argue that an increase in the risk-taking level of management plays a mediating role in the relationship between *EPU* and *GTI*. Referencing to research paper [20], the three-year volatility of return on assets (*ROA*) was used to measure the level of risk undertaken by enterprises. *ROA* is represented by the ratio of earnings before interest and taxes (*EBIT*) to year-end assets (*ASSETS*). To avoid interference from economic cycles and industry factors on the *ROA* values, we used the industry-adjusted *ROA* (*ADJ_ROA*) to measure asset returns. Here, $N = 3$ indicates the total number of years; if the *ROA* observation period is less than three years, it is excluded. *MRT* is the level of risk that the management takes; the higher the value, the higher the level of risk taken. The formulas for the above indicators are as follows:

$$ADJ_ROA_{it} = \frac{EBIT_{it}}{ASSETS_{it}} - \frac{1}{X_t} \sum_{k=1}^x \frac{EBIT_{kt}}{ASSETS_{kt}},$$

$$MRT_{it} = \frac{\sqrt{\frac{1}{N-1} \sum_{n=1}^N \left(ADJ_ROA_{it} - \frac{1}{N-1} \sum_{n=1}^N ADJ_ROA_{it} \right)^2}}{N}$$

Column (3) of Table 5 shows that the *EPU* coefficient is significantly positive, and column (4) indicates that both *MRT* and the *EPU* coefficient are significant, suggesting that the level of risk-taking plays a partial mediating role in the process of *EPU* affecting corporate *GTI*;

- (3) *IGI*. Increased *EPU* can encourage management to overcome their MMS and enhance their *MRT* by learning and updating their knowledge structure, thereby fostering *GTI* in enterprises. However, corporate *GTI* requires substantial investment in environmental research and development as a fundamental guarantee. Green innovation investment involves purchasing equipment for pollution control and energy reduction, as well as the innovation of green products and processes. This can significantly reduce industrial pollution and help to gain competitive advantages. Therefore, we used "environmental investment amount/average total assets for the period" to measure green innovation input (*IGI*) and conduct a mechanism test, with the results shown in columns (5) and (6) of Table 5. The results show that *IGI* is the transmission mechanism through which *EPU* affects the *GTI* of private enterprises;
- (4) *STC*. High-quality internal controls can promote corporate *GTI* when external risks increase, causing information asymmetry to intensify. First, internal control can help to maintain contractual relationships among all parties through risk control. High-quality internal controls can improve information disclosure and reduce the evaluation of enterprise risk judged by trading partners through comprehensive risk assessment and control activities. Second, when external risks rise, executives driven by profit and performance pressure tend to prioritize short-term gains, reducing their willingness to invest in *GTI*. Internal control can correct the management's tendency to avoid risks by designing a series of internal governance mechanisms such as supervision, checks and balances, and feedback. Third, high-quality internal controls can reduce risks in *GTI* through effective risk identification, risk assessment, and risk control measures, enhance the resilience of *GTI*, and ensure the normal conduct of *GTI* activities. To this end, we used the Dibo Index (*IC*) to measure internal control in enterprises and conduct tests, with the results shown in columns (7) and (8) of Table 5.

The analysis demonstrates that internal control partially mediates the relationship between *EPU* and corporate *GTI*.

5. Heterogeneity Analysis

5.1. Multiple Major Shareholders

When *EPU* increases, multiple major shareholders can control and threaten the management's reduction in *GTI* investment due to risk aversion through the “synergistic supervision effect” [28]. They can also bring more economic and informational resources to private enterprises by appointing directors through the “resource support effect”, helping them to make more beneficial decisions [29]. Thus, companies can promptly correct cognitive biases and strategic misjudgments to enhance risk-taking and increase their willingness for *GTI*. In the sample, investors holding more than 10% of the shares can appoint a director or senior executive to participate in the major business decisions of the company on the board of directors [22]. We define a major shareholder as one holding more than 10% of the shares. The number of shares held by “acting in concert” shareholders is combined and calculated as one shareholder. Then, it is determined whether or not they meet the criteria for a major shareholder. We divide the relative shareholding ratios of multiple major shareholders into high and low groups, based on the median by industry and year, with the estimated results shown in columns (1) and (2) of Table 6. It can be seen that the *EPU* coefficient for the group with a high shareholding ratio is significantly positive and that with a low shareholding ratio is insignificant. The *p*-value for the inter-group coefficient difference test is 0.089, indicating a difference in equity structure after the positive effect of increased *EPU* on the *GTI* of private enterprises.

Table 6. Heterogeneity Analysis.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Multiple Major Shareholders		Directors and Officers Liability Insurance		Environmental Regulation	
	High Shareholding Ratio	Low Shareholding Ratio	Yes	No	High Intensity	Low Intensity
<i>EPU</i>	0.026 ** (2.483)	0.006 (0.676)	0.016 ** (2.375)	0.019 (0.397)	0.032 *** (3.562)	0.004 (0.420)
Controls	Control	Control	Control	Control	Control	Control
Indu and year	Control	Control	Control	Control	Control	Control
Prob > chi2	0.088 *		0.000 ***		0.033 **	
Adj_R ²	0.175	0.135	0.362	0.146	0.144	0.169
N	6753	5423	391	10,055	6184	5992

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively; clustered robust standard errors at the company level are used for adjustment.

5.2. Management Liability Exemption Incentive

The impact of increased *EPU* on *GTI* may be related to management's risk-taking attitudes and incentives. To avoid potential damage to their reputations and interests from the losses that high-risk projects might incur, conservative management will proactively abandon some high-risk, high-reward projects. The Directors and Officers Liability Insurance (D and O Insurance) is a type of professional liability insurance purchased by the company for its supervisors, directors, and senior management personnel. The Directors and Officers Liability Insurance can transfer the risks caused by the company's operational

decision-making errors by the directors and officers to the insurance company, exempting the directors and officers from the liability compensation arising from decision-making errors, thereby increasing the level of risk-bearing. The risk transfer function of D and O insurance provides a “safety net” for the economic losses caused by the management’s decision-making errors. Therefore, we argue that, if private enterprises have liability insurance exemption incentives for directors, they can hedge against this risk when facing *EPU*, thereby being more inclined to strengthen *GTI*. Due to the lack of standardized regulations by the current CSRC on the disclosure of information regarding listed companies purchasing D and O insurance, we could not comprehensively collect information on the premiums paid and the corresponding coverage amounts for D and O insurance by listed companies and could only obtain information on D and O insurance purchase decisions from announcements such as shareholder meetings. To this end, we set a dummy variable for D and O insurance. If a private enterprise issued an announcement to subscribe to D and O insurance, it is recorded as 1; otherwise, it is 0. If the listed company did not state that it will stop purchasing D and O insurance in the year following the purchase, it is considered a continuous purchase, and the D and O insurance variable is 1 during this period; otherwise, it is 0. The estimation results for the two sample groups are shown in columns (3) and (4) of Table 6. From this, it can be seen that the *EPU* coefficient for the group that purchased D and O insurance is significantly positive. In contrast, the other group is insignificant, indicating that the impact of *EPU* significantly differs between companies that have and have not purchased D and O insurance. Therefore, when *EPU* increases, the Directors and Officers Liability Insurance can provide liability protection for company managers’ decision-making errors, indirectly increasing the management’s risk-taking level and “incentivizing” them to increase investment in *GTI*.

5.3. Environmental Policy Regulation

Government policies are an important factor influencing the *GTI* of private enterprises, while environmental regulation is a crucial policy tool with which the government can motivate and supervise the green innovation activities of enterprises. In 2014, China introduced a new Environmental Protection Law. In 2015, central inspections for environmental protection were piloted, achieving full coverage of 31 provinces, municipalities, and autonomous regions in mainland China. In 2018, central inspections for environmental protection were conducted. In 2021, the methods of special inspections for eco-environmental protection were officially issued. Environmental regulation policies can both impose “compliance costs” on private enterprises and provide “innovation compensation”, both of which can affect the *GTI* of enterprises. We used the completed investment amount for industrial pollution control per thousand yuan of industrial added value (deflated by the industrial product ex-factory price index) as a measure of environmental regulation intensity (*ERI*) and divided the samples into high and low environmental regulation groups. The results are shown in columns (5) and (6) of Table 6. Through the analysis, it was found that an increase in *EPU* significantly affects the *GTI* of private enterprises in China, playing a more pronounced role in private enterprises with stronger environmental regulations. Taking green credit policy as an example, it can, through the link of financing constraints, motivate enterprises to increase environmental investment and promote *GTI*, thereby improving pollution emissions. As the coverage and depth of green credit policies increase, more private enterprises will face lower financing constraints for innovation investments, and thus have more incentives and funds to carry out green innovation investments and promote *GTI*.

6. Conclusions

This study utilized manually organized data from 2013 to 2022 on Chinese private listed companies to examine the impacts of EPU on corporate GTI and its mechanisms. The results indicate that an increase in EPU has a positive impact on the GTI of private enterprises. This impact is stronger in companies with multiple major shareholders, those purchasing directors' and officers' liability insurance, and those with stricter environmental regulations. Increases in EPU indirectly promote GTI by forcing private enterprises to avoid short-sighted management tendencies, increase risk-taking levels, boost environmental protection investments, and strengthen internal controls. The findings provide a reference for the Chinese government to formulate targeted policies and financing policies to guide the green transformation of businesses; they also provide insights for enterprises in other developing countries to cope with economic policy risks and promote green technological advancement.

First, EPU was found to promote the GTI of private firms, where management myopia, investment in green innovation, and internal control are among the key transmission mechanisms. This suggests that, as the degree of EPU rises, private firms are able to promote GTI and gain a competitive market advantage in the long run by inducing management to avoid short-sightedness, increase green investment, and strengthen internal control. This result implies that, in the face of EPU, Chinese private firms can become micro-vehicles that promote green innovation, conserve energy and resources, and promote the green transformation of businesses. Although some scholars have found that EPUs inhibit GTI in certain developed economies, this study draws the opposite conclusion for an economy, such as that of China, that is in a transition period. China's specific economic background may play an important role in promoting the green transition process.

Second, the role of EPU in promoting GTI was more prominent in private firms with stronger environmental regulations. This suggests that, in the face of external EPU, the deepening of a private firm's degree of GTI is subject to the government's environmental regulation policy. In contrast, the incentives for, and effects of, private firms engaging in GTI tend to improve as the degree of government environmental regulation on them becomes stricter. In fact, environmental regulation is an important policy tool through which the government can supervise and regulate the green innovation activities of enterprises, which has a significant impact on guiding the investment direction of private enterprises. For private enterprises in China, relatively strict environmental regulation policies are conducive to their GTI, prompting them to compensate for environmental and pollution treatment costs through the "innovation compensation" effect. Of course, considering the financing difficulties of private enterprises, the government should provide financing support to private enterprises through tax cuts, thus incentivizing green innovation and achieving a win-win situation in terms of both economic and environmental performance.

Third, D and O liability insurance plays a "safety net" role for reducing losses from innovation failures and management losses in corporate GTI, and green credit policies may have a catalytic role. Therefore, private enterprises should actively purchase D and O liability insurance in a volatile economic policy environment in order to leverage its risk "safety net" and supervisory functions. From a governmental perspective, a green credit policy to increase the total supply of green credit to enterprises through top-level design can be implemented, thus promoting GTI. Green credit increases the supply of green credit to green industries, such as those involved in energy conservation and environmental protection, clean production, new energy, and clean energy, by optimizing the investment structure, giving full play to the credit resource allocation function of green credit policy. The formulation of green industrial policies should also emphasize the green innovation effect induced by the scale of demand, to tap into and stimulate the demand potential in

the field of green consumption and stimulate and release the effective demand for green products and services in the market, thus promoting the development of green industries and the green transformation of the development mode.

The limitations of this study include those related to the sample, model, and international comparisons. Data from Chinese private enterprises were used to conduct the analysis and the sample was not extended to state-owned enterprises; therefore, a comparison of the impacts of different ownership factors on the conclusions could not be performed, which may impose certain limitations on the provided policy recommendations. The model adopted was mainly a static model, which did not consider the possible lag and path-dependent characteristics of GTI; therefore, there may be some associated shortcomings, which are worth exploring in the future in greater depth. In addition, considering that our focus was not to analyze the differences between the policies of the EU and China's environmental programs, this study did not analyze their specific differences in detail; an in-depth exploration and comparison in this regard will help to deepen our understanding of the green policies of developed and transitioning countries.

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References

1. Li, Z.; Huang, Z.; Su, Y. New media environment, environmental regulation and corporate green technology innovation: Evidence from China. *Energy Econ.* **2023**, *119*, 106545. [CrossRef]
2. Geng, Y.; Zheng, Z.; Ma, Y. Digitization, perception of policy uncertainty, and corporate green innovation: A study from China. *Econ. Anal. Policy* **2023**, *80*, 544–557. [CrossRef]
3. Al-Thaqeb, S.A.; Algharabali, B.G. Economic policy uncertainty: A literature review. *J. Econ. Asymmetries* **2019**, *20*, e00133. [CrossRef]
4. Baker, S.R.; Bloom, N.; Davis, S.J. Measuring economic policy uncertainty. *Q. J. Econ.* **2016**, *131*, 1593–1636. [CrossRef]
5. Kang, W.; Lee, K.; Ratti, R.A. Economic policy uncertainty and firm-level investment. *J. Macroecon.* **2014**, *39*, 42–53. [CrossRef]
6. Peng, X.Y.; Zou, X.Y.; Zhao, X.X.; Chang, C.P. How does economic policy uncertainty affect green innovation? *Technol. Econ. Dev. Econ.* **2023**, *29*, 114–140. [CrossRef]
7. Bloom, N. The impact of uncertainty shocks. *Econometrica* **2009**, *3*, 623–685. [CrossRef]
8. Huo, M.; Li, C.; Liu, R. Climate policy uncertainty and corporate green innovation performance: From the perspectives of organizational inertia and management internal characteristics. *Manag. Decis. Econ.* **2024**, *45*, 34–53. [CrossRef]
9. Xu, S.Y.; Bian, Y.J.; Zheng, G.H. *Management and Performance of Private Enterprises in China—A Multidisciplinary Perspective*; Peking University Press: Beijing, China, 2008. Available online: https://baike.baidu.com/item/%E4%B8%AD%E5%9B%BD%E6%B0%91%E8%90%A5%E4%BC%81%E4%B8%9A%E7%9A%84%E7%AE%A1%E7%90%86%E5%92%8C%E7%BB%A9%E6%95%88/12369313?fr=ge_al (accessed on 2 January 2024).

10. Li, C.F.; Lu, N.N.; Li, D.D.; Wang, X. Corporate green innovation: Government regulation, information disclosure and investment strategy evolution. *Sci. Res.* **2021**, *1*, 180–192. Available online: https://kns.cnki.net/kcms2/article/abstract?v=94FxnJrPFCvV-S031bZUFgoVIO79Z8s7MEcJ2gyeIcGiQzi2KShXm-cRn5iMwq1a77Hj3rdhBEx_jsV0vc6aCuZ7PERHM1aCLmktuDqslZvOVNeTV7aO_GhuZQWEjGXUjzEWVYrR_Xbxcm19Xon3VwCq5vA2zrUCI9j4TlzBqqO1p3zjFxpfcemh8bekaDje&uniplatform=NZKPT&language=CHS (accessed on 1 December 2023).
11. Wolfgang, D.; Sadok, E.G.; Omrane, G.; Janzen, M. Policy uncertainty, investment, and the cost of capital. *J. Financ. Stab.* **2018**, *39*, 28–45. [CrossRef]
12. Arellano, C.; Bai, Y.; Kehoe, P. Financial frictions and fluctuations in volatility. *J. Political Econ.* **2019**, *5*, 2049–2103. [CrossRef]
13. Hu, S.; Gong, D. Economic policy uncertainty, prudential regulation and bank lending. *Financ. Res. Lett.* **2019**, *29*, 373–378. [CrossRef]
14. Cui, X.; Wang, C.; Sensoy, A.; Liao, J.; Xie, X. Economic policy uncertainty and green innovation: Evidence from China. *Econ. Model.* **2023**, *118*, 106104. [CrossRef]
15. Gulen, H.; Ion, M. Policy uncertainty and corporate investment. *Rev. Financ. Stud.* **2016**, *3*, 523–564. [CrossRef]
16. Bernanke, B.; Gertler, M. Agency costs, net worth, and business fluctuations. *Am. Econ. Rev.* **1989**, *1*, 14–31.
17. Pastor, L.; Veronesi, P. Uncertainty about government policy and stock prices. *J. Financ.* **2012**, *4*, 1219–1264. [CrossRef]
18. Zhang, D.L.; Li, S.H. Social trust, political relations and bank loans of private enterprises. *Account. Res.* **2012**, *8*, 17–25.
19. Lambert, R.A.; Leuz, C.; Verrecchia, R.E. Information asymmetry, information precision, and the cost of capital. *Rev. Financ.* **2012**, *1*, 1–29. [CrossRef]
20. Yu, W.C.; Liang, P.H. Uncertainty, business environment and business vitality of private enterprises. *China Ind. Econ.* **2019**, *11*, 136–154. Available online: https://kns.cnki.net/kcms2/article/abstract?v=94FxnJrPFCsLC9n07e00mi-IQ14Fbql1UN3IVB_GHON-QXuPVeXhFQEikN5mqGg4disxbG_Wv571L3xyOmvItS8N6Tz4C38zwfoajFlgayF1LHPCGZ_aVg81ZE9xP8SZWxeeiQXINSeEpz-wqOi0Ost74KowRQTEM0umPVwewznCd-UfziQtry2SbF8Fo1&uniplatform=NZKPT&language=CHS (accessed on 1 December 2023).
21. Tang, G.P.; Li, L.H.; Wu, D.J. Environmental regulation, industry attributes and corporate environmental investment. *Account. Res.* **2013**, *6*, 83–89+96. Available online: https://kns.cnki.net/kcms2/article/abstract?v=94FxnJrPFCtOeiDbI3pWYZnx-UyZhQ6g_b4xHDYYOMyRmDJYU7QqwcPcgurlg3oG1mRLR9BLUA_ipoIzmsHY5WVL3AEF8LRs8G2Rm2A2rDBY3QLtiOdbndfrj4gUU7b7jq86IVK_4lfYtys-U-wU-vQZqHtvhnGNgFhsS85cBQtHnGXASu8wUx68-MyF9fz&uniplatform=NZKPT&language=CHS (accessed on 1 December 2023).
22. Wang, Y.T.; Jiang, F.X. Can multiple major shareholders reduce the cost of corporate debt financing. *World Econ.* **2017**, *10*, 119–143. Available online: https://kns.cnki.net/kcms2/article/abstract?v=94FxnJrPFCv_xFXQOFU2nQ2uVN4fMiI79pdOKuVCynnuAx2dFJf7Za7eFWeuVFwUln-77xhBIBVd2ScY27ThrySBHCcfudg1qcU2-R7bsy2zC_ErZ2ar2hN0rEaKvcWyl-tfNVA-VTuholiq0ZbdfdwRqnoOH8aRTZHQzK8nvszBVDiuTE5sa7fZkiVR8PJrM&uniplatform=NZKPT&language=CHS (accessed on 1 December 2023).
23. Luo, D.L.; She, G.M. Local officials change and local debt issuance. *Econ. Res.* **2015**, *6*, 131–146. Available online: https://kns.cnki.net/kcms2/article/abstract?v=94FxnJrPFCvI9mMBHbs_6E6wyB6HQAkHynvhBLczYMihv48-ocWw1BH2uV6kgjsEiDrwF_uAYSRG0u44RC77yrkpno8-xAL6D1HRSE5n7aBbaBBjRmoQ25BwR0qPtCWAQNLm5OxhZIO2Qlw4QY6v6seqJWaxNb2HxvwtYgbM6WivjrtwmKdBE3JelpYx1d8&uniplatform=NZKPT&language=CHS (accessed on 1 December 2023).
24. Zimbardo, P.G.; Boyd, J.N. Putting time in perspective: A valid, reliable individual difference metric. *J. Personal. Soc. Psychol.* **1999**, *6*, 1271–1288. [CrossRef]
25. Holman, E.A.; Zimbardo, P.G. The social language of time: The time perspective-social network connection. *Basic Aoolied Soc. Psychol.* **2009**, *2*, 136–147. [CrossRef]
26. Shin, H.H.; Park, Y.S. Financing constraints and internal capital markets: Evidence from Korean ‘chaebols’. *J. Corp. Financ.* **1999**, *2*, 169–191. [CrossRef]
27. Carson, S.J.; Madhok, A.; Wu, T. Uncertainty, opportunism, and governance: The effects of volatility and ambiguity on formal and relational contracting. *Acad. Manag. J.* **2006**, *5*, 1058–1077. [CrossRef]
28. Edmans, A.; Manso, G. Governance through trading and intervention: A theory of multiple blockholders. *Rev. Financ. Stud.* **2011**, *7*, 2395–2428. [CrossRef]
29. Shleifer, A.; Vishny, R.W. Large shareholders and corporate control. *J. Political Econ.* **1986**, *3*, 461–488. [CrossRef]

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