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How Does Regional Trade Policy Uncertainty Affect the Quality of Imported Products?—An Analysis Using CAFTA

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ABSTRACT

We study the impact of regional trade policy uncertainty on the product quality imported from ASEAN by Chinese enterprises. The research uses micro-enterprise-level data from CAFTA and employs the DID method for empirical tests. The analysis shows that China's FTA strategy has helped reduce regional trade policy uncertainty and significantly improved the quality of imported products. The quality-improvement effect varies based on ownership types, regions, factor densities and usage properties. An impact mechanism test reveals that the decline in regional trade policy uncertainty promotes the improvement in the product quality imported from ASEAN by Chinese enterprises through the competition effect and financial constraint mitigation effect.

JEL Classification: F13, F15, F19

1 | Introduction

Recent events such as the COVID-19 pandemic, the war between Russia and Ukraine, the Sino-US trade war, and the Israeli-Palestinian conflict, Trump's return to the White House led to an unstable global trade environment and increased trade uncertainty. The global trade policy (EPU)[1] uncertainty index soared from 176.6 in 2016 to 235.27 in 2024. Against this backdrop, numerous scholars have started paying attention to this topic. Primarily focusing on exports, scholars have addressed the decline of trade policy uncertainty on the enterprises' behaviour choice to enter or exit the export market (Handley 2014; Pierce and Schott 2016; Handley and Limao 2015, 2017). Another stream looks at the influence of trade policy uncertainty on export enterprises' product prices and quality (Schott et al. 2017; Feng and Swenson 2017; Handley and Limao 2017; Chatrakamollathas and Nuengchamnong 2024). Others have explored the influence of trade policy uncertainty on enterprise productivity, procurement mode, innovation and investment (Zhou et al. 2023a; Pierce and Schott 2018; Liu and Ma 2020.) Research remains scant on the influence of trade policy uncertainty on imports (Imbruno 2019).

This study mainly explores the impact of trade policy uncertainty decline on the quality of Chinese imported products from the perspective of the China-ASEAN Free Trade Area. As is well known, there is significant trade policy uncertainty within the WTO framework, which is reflected in the large difference between binding and MFN tariffs. This has had a significant negative impact on the import trade of Chinese enterprises.

With the establishment of CAFTA, member countries began to replace MFN tariffs with preferential tariffs, which rapidly reduced the tariff trade policy uncertainty among member

countries and effectively eliminated the inherent trade policy uncertainty in the WTO framework. Therefore, it is particularly important to study the impact of trade policy uncertainty on the quality of imported products of Chinese enterprises under the CAFTA framework. Here we will first provide a detailed introduction to CAFTA.

CAFTA, officially completed on January 1, 2010, is a joint venture between China and ten ASEAN countries. The countries are Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. After the establishment of the FTA, ASEAN and China accounted for 30.18% of world trade and became a large economy covering 11 countries with a population of 2.082 billion. These countries had a GDP of 2.17 trillion US dollars.[2] CAFTA is currently the world's most populous FTA and the largest FTA among developing countries. Before the establishment of CAFTA, the average tariff trade policy uncertainty faced by Chinese enterprises' imported products was generally above 40%. See Figure 1. CAFTA requires member countries in the region to strictly follow the preferential tax (PT) under the CAFTA framework for taxation. The tax must not fluctuate arbitrarily. As a result, the tariff trade policy uncertainty in the region is reduced to 0[3].

The average quality of products imported by Chinese enterprises from ASEAN did not significantly change in the years before 2010. In contrast, the average quality significantly improved[4] after 2010. The improvement may be attributed to the establishment of CAFTA. CAFTA has reduced tariff and trade policy uncertainty, stabilised enterprises' import expectations, alleviated enterprises' financial costs, reduced the cost of importing high-quality products, promoted competition among enterprises, and thus improved the quality level of imported products for Chinese enterprises from ASEAN. Note that the quality improvement was not noticed in the countries or regions outside ASEAN. See Figure 1. In this paper, we focus on analysing the above conjecture on the association between trade policy uncertainty and the quality of imports.

The literature related to this study falls into the economic effects of trade policy uncertainty and research on enterprise import. We provide a summary of the relevant literature in these two domains.

In the economic effects of trade policy uncertainty, scholars mainly focus on the impact of the decline of trade policy uncertainty on the behaviour choice of enterprises to enter or exit the export market. Research generally supports that a reduction in trade policy uncertainty can significantly promote an enterprise to enter the export market. Handley (2014) found that a trade policy uncertainty decline in the foreign final and intermediate products encourages Chinese enterprises to enter the export market. Similar effects have been found in other economies. Reducing trade policy uncertainty promotes Portuguese enterprises to enter the export market and explains 61% of the export market entry (Handley and Limao 2015). Without a trade policy uncertainty decline, Portugal would only achieve 20% of the export market entry.

A Sino-US trade policy uncertainty reduction would lead to more Chinese enterprises exporting products to the US (Pierce and Schott 2016.) The reduction would also encourage more

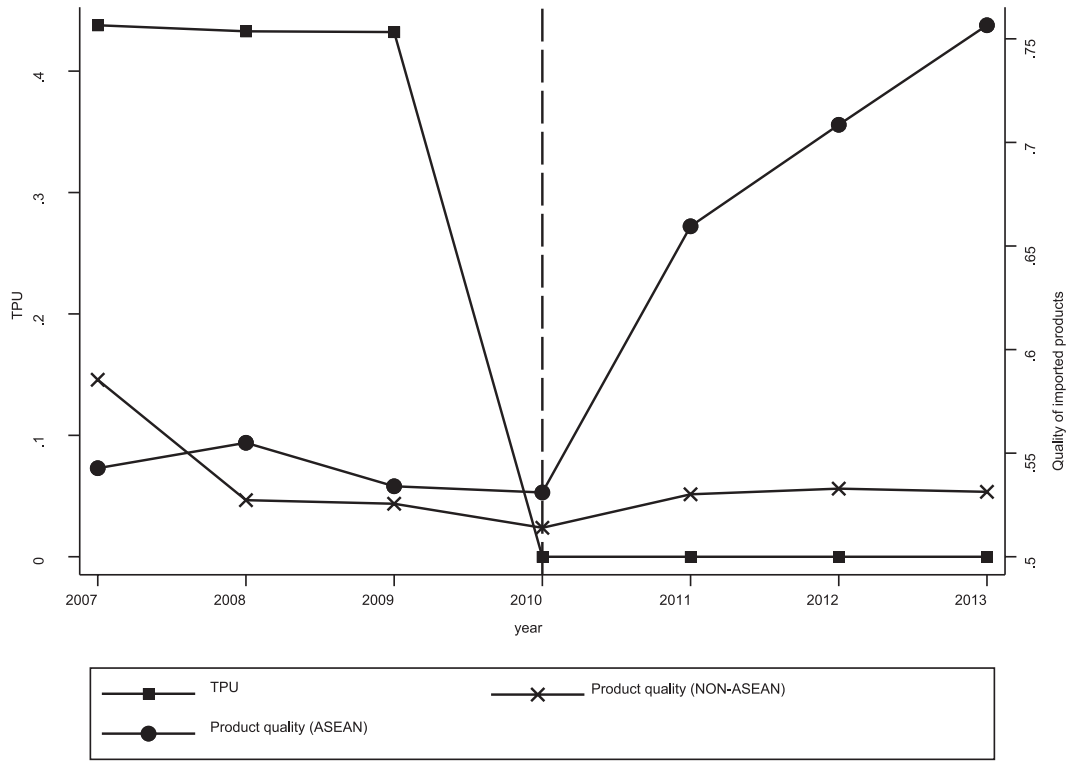

FIGURE 1 | Trade policy uncertainty and the quality of the products imported from ASEAN and Non-ASEAN regions. *Source:* Calculated and sorted according to the relevant data in the WTO tariff database and China customs database. The specific calculation method has been described in the footnote and 2.2 variable description of the article.

US enterprises to participate in Sino-US trade. Handley and Limao (2017), using the Sino-US trade data from 2000 to 2005, confirmed the existence of entry costs. They also concluded that a decline in trade policy uncertainty is conducive to enterprises entering the export market. Moreover, the fall in trade policy uncertainty has a more pronounced trade-promoting effect for industries with high entry costs. Feng and Swenson (2017) classified enterprises into continuous exporters, quitters and new entrants. They found that after a decline in trade policy uncertainty, the proportion of quitters decreases by 76%, and the proportion of new entrants increases by 67%.

Trade policy uncertainty interacts with export enterprises' product price and quality. Handley and Limao (2017) and Feng and Swenson (2017) established that a reduction in trade policy uncertainty between China and the United States resulted in decreased product prices, which is equivalent to a reduction of 8% in applied tariffs. Feng and Swenson (2017) also studied the influence of a decline in trade policy uncertainty on the quality of export products. Their analysis shows that new enterprises entering the market have better product quality due to decreased trade policy uncertainty.

Another section of the literature covers the effect of trade policy uncertainty on enterprise productivity, procurement mode and innovation. Zhou et al. (2023a) used micro-enterprise-level data from 2007 to 2013 to explore the promoting effect of reducing trade policy uncertainty on the productivity improvement of Chinese export enterprises. Schott et al. (2017) analysed the impact of trade policy uncertainty on the enterprise procurement model. When trade policy uncertainty is high, enterprises worry about the risk of a trade war and choose a US-style procurement model with a large volume and low frequency. This leads to high procurement costs and low social welfare. In contrast, with a low trade policy uncertainty, enterprises are less concerned about the risk of a trade war and choose a Japanese-style procurement model with a small transaction volume and high frequency. This leads to lower procurement costs and increases social welfare. Pierce and Schott (2018) examined the relationship between trade policy uncertainty and enterprise investment based on micro-data from the US manufacturing industry. They concluded that the decline in trade policy uncertainty decreases the investment level of US enterprises. Reducing trade policy uncertainty promotes innovations in China (Liu and Ma 2020).

In the research on imports of enterprises, enterprise imports affect their performance. Amiti and Konings (2007) studied survey data on Indonesia's manufacturing industry from 1991 to 2001. They found that a 10% decrease in the tariff rate of input goods led to a 12% rise in the productivity of importing enterprises. Yu's (2015) analysis of China's micro-enterprises data from 2000 to 2006 shows that a 10% reduction in the import tariff rate would increase the productivity of import enterprises by 12%. Similarly, a tariff rate reduction of imported inputs can significantly improve the product quality of Chinese export enterprises (Bas and Strauss-Kahn 2015). Reducing the import tariff rate can boost the innovation level of Chinese enterprises (Liu and Qiu 2016). Feng and Swenson (2017) show that reducing import intermediate tariff rates can significantly promote the expansion of Chinese enterprises' export scale. Zhu and Tomasi (2020) have explored the positive role of imports in upgrading the quality of enterprises' exported products. In addition, Huang et al. (2022) also explored the role of imported intermediate product quality in enterprise innovation.

Numerous economic factors affect the import scale of enterprises. Lu et al. (2014) used data from Colombia to study the impact of exchange rate depreciation on enterprises' import adjustment. They found that the exchange rate depreciation did not significantly reduce imported inputs but significantly reduced their variety. Li et al. (2015) systematically analysed the role of RMB exchange rate changes in enterprises' imports using customs trade data. RMB exchange rate appreciation significantly increases the probability and variety of enterprises' imports. The rate appreciation also increased the number of enterprises' imports. The exchange rate promotion effect is more significant for general trading enterprises. Reducing trade policy uncertainty promotes China's imports (Imbruno 2019). Handley et al. (2020) discussed that the reduction of trade policy uncertainty brought about by China's accession to the WTO could significantly increase the scale of intermediate goods imported by Chinese enterprises.

The existing literature has the following shortcomings: First, many studies on trade policy uncertainty analyse scenarios related to the multilateral framework mechanism of WTO. In contrast, regional trade policy uncertainty is rarely studied. Moreover, WTO's multilateral framework mechanism has limitations in reducing trade policy uncertainty. The limitations are reflected in the significant difference between bound and MFN tariffs (Osnago and Piermartini 2015). Along with the regional free trade agreements, regional preferential tariffs can help rectify shortcomings of the WTO framework mechanism and effectively reduce regional trade policy uncertainty.

Second, only recently have scholars begun to pay great attention to the effect of trade policy uncertainty on enterprises' product quality (Feng and Swenson 2017). There is relatively little research on the impact of trade policy uncertainty on the quality of imported products. Imbruno (2019) is an exception. However, Imbruno (2019) studies trade policy uncertainty and imports from the perspective of the WTO only and does not cover the uncertainty reduction and imported product quality from the standpoint of regional trade policy agreements. Furthermore, Imbruno (2019) only analyses the quality of products imported by Chinese enterprises from the US. The paper fails to comprehensively examine the impact on the quality of products imported from other countries. Theoretical and empirical research on the underlying mechanism is also missing.

Finally, the research on the impact of the decline in regional trade policy uncertainty, brought about by the formal establishment of CAFTA, on the quality of products imported from ASEAN by Chinese enterprises and the impact mechanism has not yet been explored in the literature. Our research covers these issues.

We contribute to the literature by exploring the influence of regional trade policy uncertainty on Chinese enterprises' imported product quality. Using the event of CAFTA implementation, we adopt the DID method to empirically test the impact of regional trade policy uncertainty on the quality of the products

imported from ASEAN by Chinese enterprises. Our analysis uses micro-enterprise-level data. Results show that China's FTA strategy has played an essential role in reducing regional trade policy uncertainty and significantly improved the quality of products imported by Chinese enterprises from ASEAN. The extent of the decline in regional trade policy uncertainty varies based on export enterprises' ownership type, location, factor densities and usage properties. Finally, a mechanism test reveals that the decline in regional trade policy uncertainty mainly promotes improved imported product quality through the competition and financial constraint mitigation effects. Among the two, the competition effect plays the most significant role.

This study provides a novel perspective for developing countries, including China, in improving imported product quality through a decline in regional trade policy uncertainty. The findings could help developing countries improve imported product quality. The rest of the article is outlined as follows: Section 2 introduces the construction of the econometric model, variable selection, data source, and data processing; Section 3 presents the regression analysis, heterogeneity test, and robustness test; Section 4 covers the theoretical analysis and empirical test of the impact mechanism; Section 5 concludes with policy suggestions.

2 | Model, Variables and Data

2.1 | The Econometric Model

The regional trade policy uncertainty experienced by different HS6-digit products (hereinafter referred to as HS6 products) imported by Chinese enterprises from ASEAN exhibits significant differences before and after the establishment of CAFTA. Pre-CAFTA, the regional trade policy uncertainty for China's enterprises to import HS6 products from ASEAN ranged from 12.33% to 65%.[5] After the establishment of CAFTA, the trade tariff between China and ASEAN is determined by the preferential tariffs set under CAFTA.

Compared with the Most Favoured Nation Tariffs (MFN tariffs), preferential tariffs for various commodities have a minimal fluctuation range. Moreover, Preferential tariffs under CAFTA are far lower than MFN tariffs. This implies that the difference between the MFN tariffs and the Preferential tariffs is eliminated by CAFTA. Regional trade policy uncertainty suffered by China's enterprises when importing HS6 products from ASEAN declined sharply with CAFTA. We set up a treatment and a control group to empirically analyse the impact of the regional trade policy uncertainty on HS6 products. The groups are categorised based on the extent of the decline in China's regional trade policy uncertainty faced by different HS6 products before and after the establishment of CAFTA. Finally, the following DID regression model was obtained:

$$\begin{aligned}\ln\text{quality}_{\text{ihft}} &= \beta_0 + \beta_1 \text{post}_{2010} \times \text{ptpu}_{\text{h2010}} \\ &+ \beta_2 Z_{\text{hft}} + F_{\text{hf}} + F_{\text{igt}} + \zeta_{\text{ighft}}\end{aligned} \tag{1}$$

in equation (1), the subscripts i, g, h, f and t denote the importing country, industry, product, importing enterprise and year, respectively. The cross item $\text{post}_{2010} \times \text{ptpu}_{\text{h2010}}$ captures the impact of regional trade policy uncertainty on import enterprises' product quality. post_{2010} is a year dummy variable. When $t \geq 2010$, $\text{post}_{2010} = 1$; it is 0 otherwise. $\text{ptpu}_{\text{h2010}}$ is a continuous variable, which is used to express regional trade policy uncertainty faced by an enterprise f importing HS6 product h from ASEAN before CAFTA. This method of dividing the treatment and control groups follows Lu and Yu (2015). Z_{hft} is the set of control variables; F_{hf} and F_{igt} are product-enterprises fixed effect and importing country-industry-year fixed effect. ζ_{ighft} is the error item.

2.2 | Variable Description

2.2.1 | Measurement of the Quality of the Imported Products

Product quality is an abstract concept, and obtaining micro-level data to assess quality is challenging. Therefore, to measure product quality, scholars generally use the unit-price method, simplifying data collection and calculations. However, the unit-price method has many disadvantages. The method ignores product visual appeal and design and does not consider consumer preferences. Alternate quality measurement methods exist. The nested logit model (Khandelwal 2010) and the KSW method (Khandelwal et al. 2013) are the most representative of these other methods.

KSW method has significant advantages as it can capture enterprise-level quality and accounts for the demand-side factors. The method primarily uses unit price and quantity to assess the product quality of export enterprises. In contrast, the nested logit model can only measure the country-product level quality. Therefore, we employ the KSW method.

Considering that our focus is on the quality of products imported by China's enterprises from ASEAN, we introduce year and HS6 product fixed effects to control the impact of year and product differentiation, respectively. We refer to Broda et al. (2017) for substitution elasticity values and set the value of σ to 6. Finally, we construct the quality measure used in this study:

$$\ln q_{\text{hft}} + \sigma \ln p_{\text{hft}} = \alpha_h + \alpha_t + \text{e}_{\text{hft}} \tag{2}$$

q_{hft} and p_{hft}, respectively, represent the quantity and price of HS6 product h imported by Chinese enterprise f in year t from ASEAN. α_h and α_t are the product and year's fixed effects. e_{hft} is the error term. Through OLS regression of equation (2), the residual term e_{hft} is obtained. Finally, the imported product quality at the enterprise-product-year level is obtained using equation (3).

$$\text{quality}_{\text{hft}} = \ln\left(\lambda_{\text{hft}}\right) \equiv \hat{e}_{\text{hft}} / (\sigma - 1) \tag{3}$$

The HS6 product quality imported by each Chinese enterprise from ASEAN can be calculated from equation (3). However, the quality estimated by Khandelwal et al. (2013) can only be applied to compare within a specific destination-year group. The KSW method can notbe used to compare cross-country and cross-time quality attributes. We standardise the quality value

obtained by formula (3) to address this issue. The specific standardisation method is as follows:

$$r - \text{quality}_{\text{hft}} = \frac{\text{quality}_{\text{hft}} - \min \text{quality}_{\text{hft}}}{\max \text{quality}_{\text{hft}} - \min \text{quality}_{\text{hft}}} \quad (4)$$

min is the minimum value, whereas max represents the maximum value. The normalised quality obtained by Equation (4) falls strictly between the interval [0,1] and no longer has a measurement unit. Therefore, the measure in Equation (4) can be compared across periods and sections. The results from Equation (4) can also be used for regression analysis.

2.2.2 | Core Independent Variable ($post_{2010}ptpu_{h2010}$)

The tariff method of Osnago and Piermartini (2015) is used to estimate the regional trade policy uncertainty. Specifically, this study constructed the following calculation formula: $\text{ptpu}_{\text{h2010}} = \tau_{\text{MFN,2010}} - \tau_{\text{PT,2010}}$, where $\tau_{\text{MFN,2010}}$ represents China's MFN tariffs at the HS6 product level in 2010[6]; $\tau_{\text{pt,2010}}$ is the preferential tariffs (PT for short) at the HS6 products level implemented by China toward ASEAN countries in 2010. The larger the difference between the two tariffs, the more prominent is the reduction in China's regional trade policy uncertainty after the formal establishment of CAFTA.

2.2.3 | Control Variables (z_{hfjt})

The empirical model controls for the following variables: (1) labor scale (labor) is quantified by the annual average number of employees; (2) capital density (kl) is estimated by the ratio of fixed asset's annual average balance to the annual average number of employees; (3) subsidy ratio (sub) is the ratio of subsidy income to product sales income; (4) enterprise age (age) is the difference between the current year and the establishment year of the enterprise; (5) the asset-liability ratio (lev) is the ratio of the total liabilities to the total assets; (6) return on assets (roa) is expressed by the proportion of net profit to the total assets; (7) mfn tariffs (mfn) is represented by the China's MFN tariff rate at the level of HS6 products for each year; and (8) The total factor productivity (tfp) is calculated using the C-D function method.

2.3 | Data Source and Processing

The empirical data for this study is derived from the China Industrial Enterprise database, China Customs Enterprise database, World Bank wits database and WTO tariff database from 2007 to 2013.

We employ the method Cai and Liu (2009) and Brandt et al. (2017) used to process China's industrial enterprise database. First, we eliminate samples with missing key variables (e.g., the number of employees, the net value of fixed assets, sales revenue, gross industrial product and paid-in capital), samples that violate accounting standards (e.g., total assets not equal to the sum of owner's equity and total liabilities), and samples with apparent errors (e.g., zero employees). Secondly, the quantile of important variables (e.g., industrial GDP, fixed assets' net value, profit, paid-in capital and the number of employees) is calculated, and 0.5% of the data is removed. Finally, the Producer Price Index and the Price Indices of Investment in Fixed Assets based on 2007 deflate the variables of gross industrial product and net fixed assets, respectively.

In processing the enterprise database of China Customs, (1) we drop samples with missing enterprise names. (2) Then we remove samples whose import enterprises are trading companies. (3) Based on 'year-enterprise-product-destination', the data points in the customs database are aggregated, and the duplicate samples are eliminated. (4) Only the samples with the destination of ASEAN are retained. (5) The customs data are further aggregated based on 'year-enterprise-product', and the duplicate samples are eliminated. (6) The HS codes used in the Chinese customs data sample years are inconsistent. The HS code used in Chinese customs data is HS07 Version from 2007 to 2011 and the HS12 Version from 2012 to 2013. Therefore, we select the conversion codes of HS6 products available on the United Nations website to convert customs data into the HS96 Version.

Finally, the databases are matched according to the enterprise name, postal code and telephone number. The matched database and the tariff data of the HS6 products level are combined to create the database needed for subsequent empirical analysis. The statistical description of the main variables in the final dataset is provided in Table 1.

3 | Empirical Results

3.1 | Baseline Results

Using model (1), we perform a regression analysis to assess the influence of regional trade policy uncertainty on Chinese enterprises' quality of products imported from ASEAN. The results are shown in Table 2. The relationship implies that the regional trade policy uncertainty decline caused by CAFTA has promoted the quality of products imported from ASEAN by Chinese enterprises.

3.2 | Different Ownership Types and Import Regions

To determine the potential differential effects of different ownership types, we set three dummy variables: state-owned enterprise dummy (if the enterprise is state-owned, the value of the dummy is 1; otherwise, it is 0), private-owned enterprise dummy (if the enterprise is private-owned, the value of the dummy is 1; otherwise it is 0) and foreign-funded enterprise dummy (if the enterprise is foreign-funded, the value of the dummy is 1; otherwise it is 0). We use foreign-funded enterprises as the benchmark for regression analysis. The resulting analysis is shown in Column (2) of Table 3. The coefficients of $post_{2010}ptpuh_{2010}$, $post_{2010}ptpuh_{2010}\times$state-owned enterprise dummy, and $post_{2010}ptpuh_{2010}\times$private enterprise dummy are all significantly positive. The promotion effect on private enterprises is the most obvious, while the impact on state-owned enterprises is the least. This may be due to the policy resource advantages of state-owned enterprises, which can better serve the regional trade policy uncertainty, resulting in a diminished improvement in the quality

TABLE 1 | Statistical summary.

Variable	Sample size	Mean value	Standard deviation	50% quantile	75% quantile
lnquality	203,133	0.5366	0.0676	0.5367	0.5766
$post_{2010}$	203,133	0.6523	0.0475	1	1
$ptpu_{2010}$	203,133	0.4722	0.0334	0.4921	0.5831
$post_{2010\times}ptpu_{2010}$	203,133	0.4442	0.0395	0.4862	0.6027
lnlabor	203,133	6.6211	0.0493	6.5695	7.6019
lnkl	203,133	4.4644	0.0620	4.4082	5.3800
sub	203,133	0.0015	0.0160	0	0
lnage	203,133	2.1730	0.0697	2.3026	2.7081
lev	203,133	0.5459	0.0463	0.5246	0.7057
roa	203,133	0.4748	0.0158	0.0426	0.1096
lnmfn	203,133	1.3954	0.0940	2.0020	2.3026
lntfp	203,133	4.9492	0.0700	4.8539	5.5300

Note: prefix 'ln' means natural logarithm.

TABLE 2 | Basic regression results.

Variable	(1)	(2)	(3)
$post_{2010\times}ptpu_{h2010}$	0.039*** (0.014)	0.109*** (0.024)	0.228*** (0.055)
control variable	Y	Y	Y
constant	0.537*** (0.008)	0.532*** (0.007)	0.498*** (0.009)
product fe	N	Y	Y
enterprise fe	N	Y	Y
country-industry-year fe	N	Y	Y
observations	531,437	445,069	203,133
R^2	0.000	0.396	0.391

Note: (1) *, ** and *** represent significant levels of 10%, 5% and 1%, respectively; (2) the cluster-robust standard deviation is applied at the enterprise level.

of their imported products. Private enterprises may not have this advantage. The reduction of regional trade policy uncertainty is beneficial for private enterprises to enhance their research and development efforts, promote product quality improvement, and thus promote the improvement of imported product quality.

Enterprises with different regions in China exhibit significant heterogeneity (Feng and Swenson 2017; Xu and Mao 2018). We test whether regional trade policy uncertainty's effect on the quality of imported products from ASEAN varies based on the import regions. To this end, we set two dummy variables: the eastern region dummy (if the enterprise importing from ASEAN is located in the eastern region, the value of the dummy is 1; otherwise, it is 0) and the central and western region dummy (if the enterprise importing from ASEAN is located in the central or western region, the value of the dummy is 1; otherwise it is 0). The central and western regions are set as the benchmark for the test. The regression results are shown in Column (1) of Table 3. The coefficients of $post_{2010}ptpuh_{2010}$ and $post_{2010}ptpuh_{2010}\times$eastern region dummy are significantly positive. The regional trade policy uncertainty significantly impacts the imported product quality for enterprises in the eastern region. However, the promotion effect in central & western regions is relatively small. The eastern region is the most developed and market-oriented in China. Human, financial and material resources have agglomerated in this region. The eastern region has also developed to have an industrial structure that supports high-end products. Therefore, with a decline in regional trade policy uncertainty, enterprises in the eastern region are more likely to accelerate the import of high-quality products from ASEAN. In contrast, central & western regions are relatively underdeveloped, and consumers have low demand for high-quality products. Therefore, a decline in regional trade policy uncertainty has less impact on the demand for high-quality imported products from ASEAN by enterprises in these underdeveloped regions.

3.3 | Different Factor Densities and Different Usage Properties

To test the heterogeneity in factor densities, based on Zhou et al. (2023a, 2023b), we set three dummy variables:

TABLE 3 | Results for different ownership types, import regions, factor intensities and usage properties.

Variable	(1) Different ownership types	(2) Different import regions	(3) Different factor intensities	(4) Different usage properties
$post_{2010}ptpu_{h2010}$	0.577*** (0.055)	0.077*** (0.013)	0.125*** (0.020)	0.407*** (0.107)
$post_{2010}ptpu_{h2010}$× private enterprise dummy	0.640*** (0.100)			
$post_{2010}ptpu_{h2010}$× state-owned enterprise dummy	0.492*** (0.102)			
$post_{2010}ptpu_{h2010}$×eastern region dummy		0.159*** (0.024)		
$post_{2010}ptpu_{h2010}$×labor-intensive dummy			0.162*** (0.013)	
$post_{2010}ptpu_{h2010}$×capital-intensive dummy			0.366*** (0.015)	
$post_{2010}ptpu_{h2010}$×intermediate product dummy				0.613*** (0.124)
Other variables	Y	Y	Y	Y
Constant	0.498*** (0.009)	0.498*** (0.009)	0.498*** (0.009)	0.497*** (0.009)
Product fe	Y	Y	Y	Y
Enterprise fe	Y	Y	Y	Y
Country-industry-year fe	Y	Y	Y	Y
Observations	203,133	203,133	203,133	203,133
R^2	0.391	0.391	0.391	0.391

Note: (1) *, ** and *** respectively represent significant levels of 10%, 5% and 1%; (2) the cluster-robust standard deviation is applied at the enterprise level.

labor-intensive dummy (if the enterprise exporting to ASEAN is labor-intensive, the value of the dummy is 1; otherwise, it is 0), capital-intensive dummy (if the enterprise exporting to ASEAN is capital-intensive, the value of the dummy is 1; otherwise it is 0) and technology-intensive dummy (if the enterprise exporting to ASEAN is technology-intensive, the value of the dummy is 1; otherwise it is 0). Technology-intensive enterprises serve as the benchmark in our regression. The regression results are shown in Column (3) in Table 3. The coefficients of $post_{2010}ptpuh_{2010}$, $post_{2010}ptpuh_{2010}$×labor-intensive dummy, and $post_{2010}ptpuh_{2010}$×capital-intensive dummy are all significantly positive, and the coefficient of $post_{2010}ptpuh_{2010}$×capital-intensive dummy is greater than that of $post_{2010}ptpuh_{2010}$×labor-intensive dummy; $post_{2010}ptpuh_{2010}$ is the smallest. This indicates that regional trade policy uncertainty has the most significant promoting effect on the quality of capital-intensive product imports. In contrast, it has the least promoting effect on the quality of technology-intensive product imports. The reason could be that China mainly imports capital goods from ASEAN, which are subject to significant trade policy uncertainty. Reducing regional trade policy uncertainty helps reduce the trading cost of imported capital goods, thereby helping improve their quality. However, technology-intensive products are affected by many factors, resulting in relatively low improvement effects on the quality of such imported products.

To test the heterogeneity in different usage properties, we set two dummy variables: the intermediate products dummy (if the products imported by the enterprise are intermediate products, the value of the dummy is 1; otherwise, it is 0) and the final product variables dummy (if the products imported by the enterprise are final products, the value of the dummy is 1; otherwise, it is 0). The final products are set as the benchmark for the test. The regression results are shown in Column (4) of Table 3. The coefficients of $post_{2010}ptpuh_{2010}$ and $post_{2010}ptpuh_{2010}$×intermediate products dummy are significantly positive. The regional trade policy uncertainty significantly promotes the quality of intermediate product imports. However, the promotion effect in final products is relatively weak. Perhaps it is because intermediate products are more susceptible to the impact of trade policy uncertainty.

3.4 | Robustness Test

3.4.1 | Common Trend Test

One of the critical conditions in applying the DID is conformance to the "common trend" assumption. To test for the validity of the assumption, in the analysis, we introduce an interaction term between China's regional trade policy uncertainty ($ptpu_{h2010}$)

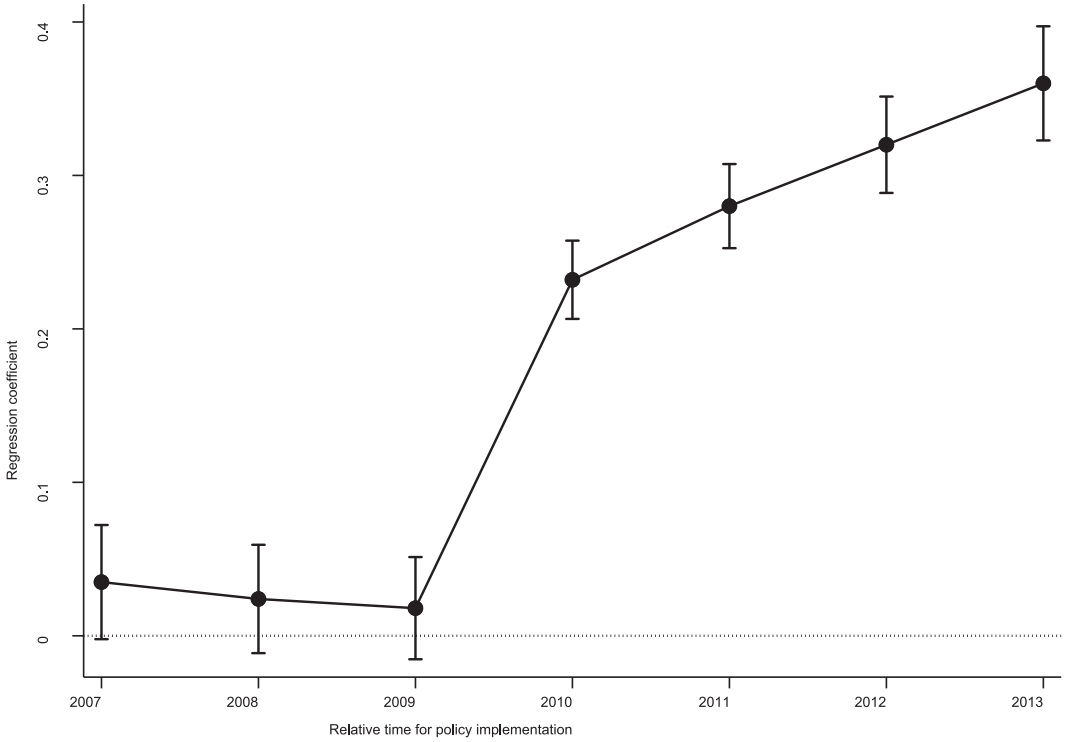

FIGURE 2 | Common trend test of CAFTA Establishment. *Source:* Calculated and sorted according to China customs database and regression with model 5. Relevant data and index processing are described in part 2.

and the year dummy variable ($year_t$). The following test model is built:

$$\ln\ quality_{hft} = \ell_0 + \sum_{t=2007}^{2013} \ell_t ptpu_{h2010} \times year_t + \ell_2 Z_{hft} + F_{hf} + F_t + \zeta_{hft} \quad (5)$$

where t ranges from 2007 to 2013. $year_t$ is a dummy variable. For example, when $t \geq 2010$, $year_{2010} = 1$, and 0 for other years. Other variables are the same as in model (1).

Figure 2 reports the analysis results of model (5). The interaction terms before CAFTA are not statistically significant, i.e., the confidence interval contains zero values. In contrast, the terms after CAFTA are significant and positive, i.e., the confidence interval does not contain zero values. The test ascertains the assumptions needed for the applicability of the DID method and thereby validates the basic regression model.

3.4.2 | Alternative Measures of the Regional Trade Policy Uncertainty

There are many different measures of trade policy uncertainty reported in the literature. The research community does not unanimously agree on the best measure and continues to develop new measures. Broader use of micro-economic data has spurred scholars to devise many trade policy uncertainty measures. Different measures and calculation standards may affect statistical results. Using only a single measure may lead to a biased result lacking credibility. We use Handley (2014) to build an additional measure of trade policy uncertainty to address this problem. The measurement formula is $ptpu = 1 - \left(\tau_{pt}/\tau_{mfn}\right)^{\sigma}$, where the parameter and processing methods are the same as model (1). σ is modelled using two values of 2 and 4. The regression analysis results are presented in columns (1–2) of Table 4. The regression results remain highly significant with the *new* regional trade policy uncertainty measure.

3.4.3 | Re-Measuring the Regional Trade Policy Uncertainty With MFN Tariffs Provided by China to ASEAN

The regional trade policy uncertainty is calculated by Chinese MFN tariffs data and preferential tariffs data toward ASEAN. MFN tariffs may change annually. To ensure the robustness of the results, we remeasure the regional trade policy uncertainty using the MFN tariffs of China in 2011. All other variables and data processing steps are the same as model (1). Results with the year 2011 MFN tariffs are reported in column (3) of Table 4. The regional trade policy uncertainty estimated using MFN tariffs in alternate years does not alter the significance of the regression results.

3.4.4 | Alternate Quality Measure Using Different Values of σ

We chose the Khandelwal et al. (2013) method to measure Chinese enterprises' quality of imported products from ASEAN. The measurement method requires the value of σ as an input. In the basic regression model (1), we refer to Broda et al. (2017) and set the value of σ to 6. However, the product

TABLE 4 | Robustness tests.

Variable	(1) $\sigma=2$	(2) $\sigma=4$	(3)	(4) $\sigma=8$	(5) $\sigma=10$	(6)
	The regional trade policy uncertainty is re-estimated by Handley (2014)		**Re-estimate the regional trade policy uncertainty by using China's MFN tariffs in 2011**	**Refer to Broda (2006) and use different values of σ**		**Non-standardised product quality**
$post_{2010} \times ptpu_{h2010}$	0.677*** (0.024)	0.139*** (0.041)				
$post_{2010} \times ptpu_{h2011}$			0.307*** (0.052)			
$post_{2010} \times ptpu_{h2010}$				0.246*** (0.054)	0.257*** (0.054)	6.699*** (1.641)
Other variables	Y	Y	Y	Y	Y	Y
Constant	0.507*** (0.011)	0.505*** (0.011)	0.497*** (0.009)	0.499*** (0.009)	0.499*** (0.009)	1.507*** (0.266)
Product fe	Y	Y	Y	Y	Y	Y
Enterprise fe	Y	Y	Y	Y	Y	Y
Country-industry-year fe	Y	Y	Y	Y	Y	Y
Observations	130,495	130,495	203,133	203,133	203,133	203,133
R^2	0.432	0.432	0.391	0.396	0.395	0.302

Note: (1) *, ** and *** represent significant levels of 10%, 5% and 1%, respectively; (2) the cluster-robust standard deviation is applied at the enterprise level.

quality measure may differ based on the value of σ. To ensure our results are robust, we remeasure the product quality using two additional values of σ as 8 and 10. The regression results, presented in columns (4–5) of Table 4, indicate that our results are valid and significant for alternative quality measures. Model (1) results are robust.

3.4.5 | Adopting Non-standardised Product Quality

This paper used a standardised product quality in the basic regression. Product quality varies significantly between a model with or without standardisation. Do the results of the basic regression show significant heterogeneity between standardised and non-standardised quality measures? We perform regression using a non-standardised measure of quality. The results are shown in column (6) of Table 4. The statistical results remain the same as in model (1).

4 | Mechanism Test

The regression results using model (1) and the robustness tests of Section 4 ascertain that the decline in regional trade policy uncertainty leads to an improvement in the quality of products imported from ASEAN by Chinese enterprises. The regression model, however, does not reveal how trade policy uncertainty impacts import product quality. Therefore, we study the impact mechanism. Specifically, we explore the theoretical impact mechanism from the perspectives of the competition effect and financial constraint mitigation effect. We present empirical tests to establish the impact mechanism.

4.1 | Impact Mechanisms

4.1.1 | Competitive Effect Mechanism

The decline in regional trade policy uncertainty has significantly reduced the uncertainty in tariff and non-tariff measures among member countries (Zhou et al. 2023b). The reduction has enhanced the predictability and controllability of trade policies among enterprises (Handley 2014). Under reduced uncertainties, enterprises proactively participate in trade activities and expand the trade scale (Handley and Limao 2015). Also, the stability of the trade policy encourages additional enterprises to enter the international market, leading to increased market competition (Feng and Swenson 2017).

Compared to domestic enterprises, foreign enterprises generally have more advanced production technology, low consumables, high production efficiency, and high product quality, which can better meet consumers' complex and diverse needs. Therefore, to survive and develop, domestic enterprises will inevitably boost their investment in research and innovation and increase their imports of technologically advanced high-quality raw materials products. They can produce technologically advanced products in a wider variety and high volume through research, learning, absorption and innovation. The quality may also be achieved at a low cost and high efficiency.

Innovative products are more competitive and favoured by consumers (Brandt et al. 2017). Domestic enterprises can reduce the production of low-quality products and concentrate resources to create their core products (Manova and Yu 2017), which may help capture the market with 'high, fast, good and new' products. Based on this, the fierce market competition triggered by the reduction of regional trade policy uncertainty will inevitably increase domestic enterprises' import demand for high-quality raw materials, intermediate products, and high-tech products and ultimately promote the improvement of imported product quality.

4.1.2 | Financial Constraint Mitigation Effect Mechanism

Financial constraints pose challenges to upgrading the export product quality of enterprises. Compared to domestic enterprises, export enterprises may need to invest significant sunk and fixed costs in the export process (Amiti and Weinstein 2011; Feenstra and Romalis 2014), requiring more substantial financial resources. Therefore, financial constraints may substantially influence decisions made by export enterprises. From the perspective of the impact of financial constraints on the quality of enterprises' exported products, it can be seen that to achieve product quality, enterprises need to increase their R&D investment and boost the import of high-quality intermediate and related capital goods.

When facing financial constraints, enterprises may reduce high-risk R&D investment and purchase high-quality imported intermediate goods. Such constraints may inhibit the enterprise's product quality upgrading. Ciani and Bartoli (2015) used Italian micro-enterprise data to demonstrate that financial constraints can limit improving export product quality for a given enterprise's productivity. Bernini et al. (2015) used data from French companies. They found that financial constraints caused by excessive debt burden and tight liquidity significantly inhibit companies from improving the quality of their exports. Furthermore, Crinò and Ogliari (2014) introduced corporate financial constraints and export product quality factors into the Helpman et al. (2008) heterogeneous trade model. They theoretically elucidate the negative impact of financial constraints on export product quality.

The reduction in regional trade policy uncertainty is an important factor in alleviating the financial resource constraints of Chinese export enterprises. An optimistic outlook could help companies explore additional revenue streams and enter overseas markets. Such steps could help expand the financing scope from a single domestic market to domestic and international financial markets (Tornell and Westermann 2003). Regional trade policy uncertainty also makes financial information more accessible, significantly reducing the information asymmetry between financial institutions and export enterprises.

Enterprises may signal to banks and other financial institutions regarding their financial strengths. Such signals could help build trust and increase the willingness of institutions to finance export enterprises, promote higher loan quotas and

lower interest rates. These, in turn, reduce external financial costs. The above-listed initiatives could help alleviate external financial constraints of Chinese export enterprises. Alleviated financial concerns could allow Chinese export enterprises to focus on producing and exporting high-quality products while expanding the import scale of high-quality intermediate goods and ultimately promoting the upgrading of the quality of imported products by Chinese enterprises.

4.2 | Selection and Measurement of Intermediate Variables

We choose appropriate measurement indicators to explore the impact mechanism that allows us to conduct the empirical test. We use the Herfindahl–Hirschmann index (HHI) to measure the Competitive effect. The financial constraint mitigation effect is measured by the ratio of interest expenses to the enterprise's total assets. Considering that the financial constraint mitigation effect mainly considers the changes in the quality of imported products by export enterprises, this study selects export enterprise samples for analysis in the empirical process of this mechanism, thereby deleting enterprises that only import but do not export.

4.3 | Empirical Test

We now test whether the two proposed theoretical mechanisms are tenable under empirical tests. Additional interaction variables are introduced for testing. Specifically, we create an interaction between the core independent variables and HHI and the ratio of interest expenses to the enterprise's total assets. The results are reported in columns (1–2) of Table 5. The coefficients of interaction items are all positive and are valid at a 1% significance level. The tests confirm that the decline in the regional trade policy uncertainty affects the quality level of products imported from ASEAN by China's enterprises through the competitive effect mechanism and financial constraint mitigation effect mechanism. Of the three, the competitive effect mechanism is the most significant contribution. Specifically, a 1% improvement in the competitive effect mechanism can bring about a 0.323-unit enhancement in the quality of the products imported from ASEAN by China's enterprises.

5 | Conclusion and Suggestions

In this study, we explored the impact of a decline in regional trade policy uncertainty on the quality of imported products. Using data from the establishment of CAFTA, we contribute to the literature in the following ways: (1) the decline of regional trade policy uncertainty can significantly enhance the quality of products imported from ASEAN by Chinese enterprises; (2) The regional trade uncertainty decline has heterogeneity in the quality promotion effect. We explore the heterogeneity based on the ownership type (state-owned, private and foreign-funded enterprises), physical location region (eastern and central & western region), factor intensities (capital-, labor- and technology-intensive industries), and different usage properties (Intermediate and final products).

The heterogeneity tests reveal that lowering regional trade policy uncertainty improves the quality of products imported by state-owned enterprises, private enterprises and foreign-funded enterprises. Among them, the improvement effect of private enterprises is the most significant. The improvement effect is prominent for an enterprise in the eastern region. Enterprises in central & western regions experience relatively low improvement effects. The improvement effect of capital-intensive products is the most obvious, whereas the improvement effect of technology-intensive products is the lowest. The improvement effect of intermediate products is significant, whereas the improvement degree of final products is relatively low.

(3) A mechanism test reveals that reducing regional trade policy uncertainty promotes the quality of products imported from ASEAN by Chinese enterprises through the competitive and

TABLE 5 | Mechanism regression results.

	(1)	(2)
variable	**Competition effect mechanism**	**Financial constraint mitigation effect mechanism**
$post_{2010} \times ptpu_{h2010}$	0.287*** (0.057)	0.351*** (0.045)
$post_{2010} ptpu_{h2010} \times$ Competitive effect mechanism	0.323*** (0.056)	
$post_{2010} \times ptpu_{h2010} \times$ Mitigating financing constraints mechanism		0.267*** (0.052)
Other variables	Y	Y
Constant	0.237*** (0.0158)	0.574*** (0.023)
Enterprise-product FE	Y	Y
Year FE	Y	Y
Observations	203,133	132,201
R^2	0.491	0.393

Note: (1) *, ** and *** represent significant levels of 10%, 5% and 1%, respectively; (2) the cluster-robust standard deviation is applied at the enterprise level.

financial constraint mitigation effects. Of these, the competitive effect plays the most impactful role, with a 1% improvement in the import trade environment leading to about 0.323-unit enhancement in the product quality imported from ASEAN by China's enterprises.

Our research has wide-ranging research and policy implications. Regional trade agreements have numerous economic and social benefits. China should accelerate the construction of regional free trade areas through Regional Comprehensive Economic Partnership agreements. The central government of China should actively explore building a China-EU FTA and joining the Transatlantic Trade and Investment Partnership. Creating additional trade agreements would uplift the product quality available in the Chinese market. It will also promote Chinese enterprises to improve productivity and product quality. In all, such actions would help China transition to a high-quality economy.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Endnotes

[1] www.policyuncertainty.com.

[2] Based on relevant data compiled by the China Bureau of Statistics (www.stats.gov.cn).

[3] The basic calculation formula is $\text{ptpu}_{h2010} = \tau_{MFN,2010} - \tau_{PT,2010}$, where $\tau_{MFN,2010}$ represents China's MFN tariffs at the HS6 product level in 2010; $\tau_{PT,2010}$ is the preferential tariffs (PT for short) at the HS6 products level implemented by China toward ASEAN country in 2010. For details, please refer to 3.2.2. Core independent variable.

[4] This study used the method of Khandelwal et al. (2013) to calculate the prodcut quality, and then took the average of product quality based on the year, and finally took the logarithm.

[5] The basic calculation formula is $\text{ptpu}_{h2010} = \tau_{MFN,2010} - \tau_{PT,2010}$, where $\tau_{MFN,2010}$ represents China's MFN tariffs at the HS6 product level in 2010; $\tau_{PT,2010}$ is the preferential tariffs (PT for short) at the HS6 products level implemented by China toward ASEAN country in 2010. See section 3.2.2 for details. Core independent variable.

[6] This study also uses China's MFN tariffs for other years for robustness testing.

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