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#### Article

# Impact of trade policy uncertainty on export products quality: New evidence by considering role of social capital

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### Impact of trade policy uncertainty on export products quality: new evidence by considering role of social capital

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#### ABSTRACT

An increase in trade policy uncertainty raises policymakers' concerns, as it can be harmful to investments and growth globally. This study examines the impact of reducing trade policy uncertainty on export product quality. Based on the ASEAN-China Free Trade Area (ACFTA), the difference-in-difference, two-way fixed, and triple difference methods were used to conduct benchmark tests. The results show that reducing trade policy uncertainty improves export product guality. Social capital has strengthened the role of the changing trade environments. The results were robust after the PSM-DID, placebo test, and deletion of outliers. Furthermore, the role of social capital is incorporated into the regression model. From the perspective of informal internal systems, this study expands the theoretical view of regional trade integration research and answers the current trade strategy adjustment and export transformation policy concerns.

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#### **KEYWORDS**

Trade policy uncertainty; social capital; export products quality; ASEAN-China FTA

#### 1. Introduction

Trade policies determine the size of markets for firms' output and hence strongly influence foreign and domestic investments. Over time, the influence of trade policies on investment has grown (OECD, 2012). Policymakers worldwide are fretting about trade policy uncertainty (TPU) and its impact on the global economy. Lin and Sim (2013) define trade uncertainty as a fundamental non-economic component that drives trade, affecting income. According to the World Bank "confidence and investment could be markedly impacted by a sudden rise in policy uncertainty, triggered, for instance, by substantial new trade barriers between major economies" (World Bank's Global Economic Prospects, 2019). For instance, the US and China engaged in a tit-for-tat tariff imposition over more than two years, affecting billions of US dollars lost to the world economy. Caldaraet al. (2020) and Handley and Limao (2017) also argued that an increase in trade policy uncertainty is perceived to dampen investments and economic growth.

Feng, Li, and Swenson (2017) provided significant evidence that reduced trade policy uncertainty concurrently induced firm entry and exit from export activity within fine product-level markets. Firms face considerable uncertainty about the future conditions that affect their costs, demand, and profitability. Zhang, Shi, Wang, and Jin (2019) and

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Zhang and Tian (2018) argued that a recent complex trading environment has led to increased trade uncertainty, reduced the stability and sustainability of exports, and caused a significant impact on the quality of export products. Future conditions are particularly important when firms decide on costly irreversible investments such as adopting a technology, new goods production, or selling in a new market. Uncertainty is a latent variable; hence, measuring uncertainty associated with trade is not straightforward. Baker, Bloom, and Davis (2016) solved this problem by analysing the number of newspaper articles dealing with trade-related uncertainties and then quantifying the same into a monthly index for the US. Ahir, Bloom, and Furceri (2022) constructed the World Trade Uncertainty (WTU) index by counting the number of times "uncertainty" is mentioned in proximity to a word related to trade in the Economist Intelligence Unit (EIU) country reports. It is evident that globally, the WTU index is rising sharply and has been stable at low levels for about 20 years, specifically owing to uncertainty related to US-China trade tension (Ahir et al., 2019).

Since China joined the World Trade Organization (WTO), the types and quantities of export commodities have expanded rapidly. According to the National Bureau of Statistics, China's total exports in 2019 reached US\$2.5 trillion, which is 10 times the total exports in 2000. However, with the increasing trade uncertainty and the transformation of China's population growth model, the traditional demographic dividend tends to disappear (Cai, 2010). The "Government Work Report" has repeatedly emphasized promoting the transformation and upgrading of China's export products and the trade competitiveness of enterprises. Zhou (2019) and Tong and Li (2015) argued that the decline in trade policy uncertainty has a positive effect on the stability and innovation of export products. Liu and Ma (2020) find that reducing trade policy uncertainty encourages firms' patent applications. Firms in sectors with a larger reduction in uncertainty filed more invention patent applications after China's WTO accession. Further, Limão and Maggi (2015) argued that governments have stronger incentives to sign trade agreements when the trading environment is more uncertain. In this context, Regional Comprehensive Economic Partnership (RCEP) pact between China, Japan, Australia, New Zealand, South Korea, and the ASEAN countries was signed in 2020. This was to reduce trade uncertainty and strengthen economic ties within the region and add \$200 billion to the global economy per year by 2030 (Elegant, 2020). This study examines the impact of trade policy uncertainty on export product quality after the establishment of the ASEAN-China Free Trade Area (ACFTA). The ACFTA was signed in 2004, and since then, China has consistently ranked as ASEAN's largest investor over the last decade, with a total trade of over US\$731 billion in 2020. There is no systematic study on the impact of trade policy uncertainty and export product quality at the export competitiveness level.

Another noteworthy phenomenon in the literature is that the export effects of declining trade policy uncertainty vary widely from region to region (Facchini, Liu, Mayda, & Zhou, 2019). Even after controlling for the area, industry, enterprise, and other fixed effects, the role of the decline in uncertainty still varies significantly. Therefore, apart from the role of unchanging regional characteristics, what factors lead to the regional heterogeneity of trade policy effects within a country with the same formal system as China? This study attempts to provide a new way of thinking about this problem from the social capital perspective, the most important informal system. As a wider framework of "hidden" behaviour, social capital plays the role of informal systems (Woolcock, 2001). Social capital comprises the normative characteristics of citizens' customs, individual behaviours, and relationships with others through a relationship mechanism. Fukuyama (2001) defines social capital as "social capital is an instantiated informal norm that promotes co-operation between two or more individuals". Kaasa's (2009) findings support the argument that social capital influences innovation activity. Guiso, Sapienza, and Zingales (2004) suggested that social capital can increase trust between groups and improve the efficiency of economic operations through repeated transactions.

This study measured the quality of export products at the urban level in terms of the trade policy uncertainty index and the enterprise-level from 2006 to 2013. This study attempts to contribute to the literature in the following aspects: First, it promotes the study of trade uncertainty to the level of product quality. China's trade policy objectives have gradually shifted from export volume expansion to product quality improvement, but the existing literature is still mainly about export quantity; it cannot answer the quality perspective of policy concerns. This study directly tested the effect of trade policy uncertainty on product quality by measuring the quality of export products at the "enterprise-year-product-destination" level. This will overcome the mismatch between the evaluation tools and policy objectives and improve the effectiveness of the results. Second, we consider the role of social capital in this region. Presently, the relevant literature mainly focuses on the analysis of the effect of the formal system change on policy uncertainty. No literature considers the influence of the informal system within the region on the effect of policy transmission. Additionally, this study explored the mechanism of social capital. The existing literature analyzes its mechanism of action owing to social capital measurement's difficulty. This study used social networks, behavioural norms, and value guides to test the specific functional mechanism of social capital on product quality using the intermediary effect model.

The remainder of this paper is structured as follows: The second part explains the theoretical framework, the third part discusses the methodology, and the fourth part presents the empirical results. The final part concludes the study and highlights policy implications.

#### 2. Theoretical framework

#### 2.1. The impact of trade policy uncertainty on the quality of export products

At the enterprise level, existing literature confirms that the export threshold is an important factor in the improvement of the product quality of enterprises (Fan, Li, & Yeaple, 2015; Helble & Okubo, 2008). Trade policy uncertainty is the risk of tariff reversal. It has real economic effects. In a trade model with heterogeneous firms, Handley (2014) shows that uncertainty over future trade conditions creates the option value of waiting to enter a new market, thus inducing firms to delay entry into a foreign market. The risk of a trade policy reversal acts as a fixed cost to enter an export market and, therefore, negatively impacts the extensive margin of trade. In this setup, tariff commitments under the WTO should increase the number of products that countries trade. Few studies have confirmed that trade policy uncertainty significantly impacts the quality of export products, but the conclusions are not consistent. Upon examining the

change in product export prices and quality induced by trade policy uncertainty, Feng et al. (2017) found that trade policy reductions induced the reallocation of export market share from high-price, low-quality exiting exporters to low-price, high-quality new exporters. The results showed that after China acceded to the WTO, many enterprises with high-quality products that entered the export market increased significantly. The number of enterprises with low-quality products exiting the market increased; thus, the average quality of their export products increased.

Further, Wang, Wang, and Su (2020) developed a model of the relationship between trade policy uncertainty and export performance using export and tariff data from China and 12 FTA partners between 2002 and 2014 to explore the role of the decline in regional trade policy uncertainty in export upgrading. They found that the decline in trade policy uncertainty can significantly improve the quality of export products. Sun and Zhou (2020) examined the China-ASEAN Comprehensive Economic Cooperation Framework Agreement in 2002 as a natural experiment, using the 2001–2007 enterprise data sample to study the role of the decline in trade policy uncertainty and obtained similar conclusions. Additionally, the literature on export product distribution optimisation (Wang & Zhou, 2017), export product quality innovation (Tong & Li, 2015), and other aspects indirectly confirmed the decline in trade policy uncertainty on the positive effects of export product quality. Ndubuisi and Owusu (2021) investigated how participation in the global value chain (GVC) affects the quality of exported products. The study found that participation in the GVC positively impacts the quality of exported products and brings the quality level closer to the quality frontier.

In contrast, Su, Peng, and Lan (2016) employed a double differential estimation model to estimate the impact of the decline in Sino-US trade uncertainty on the quality of China's export products. It was found that a stable trade policy will allow low-quality enterprises to enter the export market in large numbers and reduce the average quality of export products. Meng, Milner, and Song (2020) used the 2000–2014 Customs and Global Antidumping Database (CGAD) to examine the role of anti-dumping in the quality of export products. The results showed that the quality of export products would improve in the face of anti-dumping impact. This indicates that an increase in trade policy uncertainty will force enterprises to take the initiative to improve product quality to ensure exports. This effect is more significant than in low-quality enterprises in the sample of higher product quality.

Why does the decline in trade policy uncertainty have almost the opposite effect on the quality of China's export products? This may be because existing literature ignores the differences in policy effect transmission caused by the characteristics of regional systems. This is mainly due to the Chinese mainland's implementation of a unified formal system; regional differences are small, and formal system differences in the interpretation of reality are limited. However, regional differences are widespread at the informal system level. China's vast territory and culture have given birth to different regions' complex and distinctive social capital. Although social capital, such as value orientation, interpersonal relationships, social convention, and behavioural norms, which are formed based on geographical, cultural, historical, and environmental background, is not documented, it is agreed upon among the people. It is practically binding, which constitutes the "hidden" institutional framework and has a broad and profound influence on individual behaviour and economic organisation. Therefore, the role of social capital regulation cannot be ignored when discussing the impacts of the changes in the trade environment.

#### 2.2. The role of social capital

Social capital has a wide range of connotations as a comprehensive feature of social factors. Specific to the functionality of its informal system, it can be divided into a relationship, constraint, and value-guidance mechanisms. These three types of social capital influence the effect of policy transmission through social networks, behavioural norms, and value orientation. According to Fukuyama (2001), social capital is an instantiated informal norm that promotes cooperation among individuals. In the economic sphere, it reduces transaction costs, and in the political sphere, it promotes the kind of associational life necessary for the success of limited government and modern democracy.

The relationship mechanism of social capital refers mainly to the relationship between individuals or groups based on social networks, which affects economic operations and reacts to changes in the external environment through employment matching, information sharing, mutual assistance, and other contact mechanisms. Early literature used communication frequency to measure social networks. With the development of communication technology, the communication function of paper letters gradually weakened, and some documents used telephones and networks to measure social networks (Yan, 2012). Despite the rapid development of various formal intermediaries and information channels, employment support provided by kinship, blood, and geographic relationships still plays an irreplaceable role in labour-enterprise relations. Even in highend labour markets, such as technology, management, and research, the flow of talent based on "learning" and "career" circles is widespread. Through the matching of labour supply and enterprise demand, the relationship mechanism can help reduce search costs, shorten the matching time, and improve the ability of export enterprises to react to changes in trade policy uncertainty. Through a sample survey of employed people in Tianjin in 1999, Bian and Zhang (2001) found that the "strong relationship" of the labour force could help them obtain employment resources. In information sharing between similar enterprises, the trust relationship in the research team can promote knowledge sharing and product quality innovation. The social network structure of researchers and enterprise leaders can also bring together scientific research talents and produce a pooling.

Using the chain director data of domestic listed enterprises, Wang and Zhang (2018) studied the influence of the company's social network on enterprise innovation. They found that the social network of the directors of the enterprise has the role of intelligence, which has greatly improved the innovation level of the enterprise. In addition to upstream and downstream enterprises, good social capital also helps enterprises establish stable upstream and downstream cooperative relations. Export uncertainty increases in the trading environment, extends a complete product ecological chain and enhances the autonomy of enterprise production. Mutual aid mechanisms formed by social relations also help enterprises resist risks and relax their financing constraints. Social capital can promote the establishment of guarantees, cooperation, investment, and other economic

relations between enterprises, help enterprises relax financing constraints, and improve export competitiveness. Additionally, mutual assistance mechanisms between enterprises play a role in spreading risk and increasing the incentive for enterprises to take the initiative to improve product quality (Xu & Yuan, 2017).

The restraint mechanism of social capital mainly refers to the behavioural restraint between individuals, organisations, and groups formed through the social seal and reputation mechanism. It promotes product quality improvement by improving the industry's organisation model, governance level, and self-discipline. A social seal refers to society's unified identity cognition, which gives all the group members a social seal. The consequences of the individual's behaviour are borne collectively by the group. For example, when individual behaviour leads to negative news, it can affect the group's image, thus establishing mutual restraint mechanisms among members. For individuals, group restraint based on family, social, and professional relations can restrain moral risk and thus improve the effectiveness of entrustment agents. This is conducive to the construction of non-blood-related modern management enterprises and improves the ability of enterprises to respond to changes in the trading environment.

Liu and Yang's (2012) study of rural cooperative organizations found that the level of social capital largely determines the existence and growth of modern cooperative methods. As argued, when an export environment improves, businesses face both quantity and quality priorities. Conversely, group constraints improve scientific decision-making, help suppress opportunism, avoid the excessive pursuit of short-term profits, and neglect the quality of products. In contrast, they also improve the level of internal governance and operational efficiency of enterprises and guarantee the ability of enterprises to improve the quality of products. At the industry level, a single enterprise can spill over into the reputation of a homogeneous enterprise (Fei, 2010). The resulting industry constraints can improve industrial governance and self-restraint and prioritize product quality. Chen and Ping's (2020) Research on China's dairy industry confirms that social capital based on the "certification" relationship constitutes the link between the collective reputation of the industry and the behavior of individual enterprises.

The value-guidance mechanism of social capital mainly refers to the role of trade policy changes through the value orientation of individual integrity, corporate responsibility, and social atmosphere, based on the moral norms formed by culture, beliefs, and traditions. The view of the right and wrong of good social capital helps shape the integrity quality of individuals or enterprises. Conversely, it reduces the probability of default through value norms and ensures the stability of economic operation and the effectiveness of policy transmission. In contrast, it improves trust and financial participation and provides good financing support for enterprise innovation and development. Ma (2010) and Cui (2013) confirmed that companies in high-trust areas have easier access to finance. Value guidance in social capital can shape the enterprise's social responsibility, improve the consistency of its goals and policy orientation, and take the initiative to upgrade quality. It also helps form good inter-company relationships and promotes the development of new technologies and products through interaction and feedback. Value guidance can provide individuals with moral and vulgar behaviour. The formal system cannot provide a completely detailed and clear provision of microeconomic behavior. The moral standard and metaphor method provided by value guidance can compensate for the lack of a formal system, reduce the market friction caused by incomplete contracts, and optimise the innovation environment of enterprises. Lin's (2012) research on social capital and enterprise innovation behaviour found that social capital effectively compensates for the deficiency of the regional property rights system. It reduces the moral risk of technology leakage, shortens the incubation cycle of results, and promotes enterprises' innovation performance.

The above literature shows that social capital has an important regulatory effect on economic activities and policy effects as a widespread informal system. However, in trade, the important role of social capital in adjusting export product quality caused by the decline in trade policy uncertainty is not covered. This study attempts to complement the theoretical interpretation of reality from this perspective by examining the impact of the decline in trade uncertainty on the quality of export products, evaluating the regulatory role of social capital, and empirically testing its mechanism of action.

#### 3. Methods

#### 3.1. Stylized facts

The trend of export litigation cases encountered by China is similar to that of TPU change, especially in the years with great TPU changes. Such as 2001–2002 and 2007–2008, the trend of export litigation cases encountered by China followed the trend of TPU change. When trade policy uncertainty increases, cases also rise to a certain extent. When trade policy uncertainty policy stabilises, export litigation cases also decline. For example, trade policy uncertainty significantly increased following the 2007 global financial crisis and the number of China's export litigation cases.

Faced with export risks in recent years, the Chinese government has made great efforts to enhance the stability of its export policy, actively promoted regional trade agreements to cope with the adverse impact of the decline of the global trade framework, and provided a good policy environment for the upgrading of export products. For instance, the recent pact in 2020 (the RCEP) signed between China and 14 other regional countries, including Korea, Japan, New Zealand, Australia, and ASEAN, is expected to reduce trade barriers and increase economic cooperation.

As shown in Figure 1(a),<sup>1</sup> the upward trend of trade uncertainty faced by China since the establishment of the ACFTA has been curbed. It can be seen that the quality of export products of enterprises began to climb gradually in 2010 owing to the impact of stable export expectations. Figure 1(b) shows the relationship between trade policy uncertainty and export product quality more intuitively. The trend between the two shows a clear negative correlation, indicating that the decline of trade policy uncertainty is conducive to the improvement of export product quality.

<sup>&</sup>lt;sup>1</sup>The data source of China's trade policy uncertainty is gotten from www.policyuncertainty.com, developed by Baker, Bloom, and Davis. To show a clearer comparison of trends, the mean values of these two variables are removed, and only the trends are retained. Data on the number of export cases are from China Trade Remedies Information (mofcom. gov.cn). Export product quality is computed by the authors in the same way as Amiti & Khandelwal with the Chinese Industrial Enterprises Database and Chinese Customs Database (2003–2012); see more detail in section 3.3.



Figure 1. (a) *China's* trade policy uncertainty and trade respondent cases. (b) *China's* trade policy uncertainty and export product quality.



Figure 2. Quality of export products of different social capital cities in 2010.

Figure 1(a) shows the trend of TPU and export litigation cases encountered by China from 2001–2011. After China acceded to the WTO, the uncertainty of trade policy showed a clear downward trend, reaching its lowest point in 2007. Under the influence of the global economic crisis, China's trade policy uncertainty has risen sharply since 2008 and entered a high-risk period of trade policy.

Considering the heterogeneity caused by differences in social capital, Figure  $2^2$  reports the average export product quality of the two sample regions in 2010 for the first- and third-quartile social capital, respectively. The results show that in regions with higher social capital accumulation, the quality of export products improved more significantly after the decline in trade policy uncertainty. The quality of export products in the first quantile social capital regions exceeded that of the third quartile twice. The above results

<sup>&</sup>lt;sup>2</sup>The authors compute the data source of Export product quality with the Chinese Industrial Enterprises Database and Chinese Customs Database as introduced in section 3.3. The authors measured social capital with the city level number of civil society organizations per 10,000 people from the China Civil Society Organization Rating Database.

initially confirm the important regulatory role of social capital. The regional heterogeneity of social capital may be an important reason for regional differences leading to the effect of changes in the trade environment.

#### 3.2. Core variables measurements

#### 3.2.1. Export product quality

This study adopted Wang and Shi's (2014) computation idea and employed the regression anti-inference method to calculate the quality of export products. We assume monopolistic competition with constant elasticity of substitution (CES) demand. Using customs HS6-based product j, the number of exports of enterprise i to m countries in t year is:

$$q_{jimt} = p_{jimt}^{-\sigma} \lambda_{jimt}^{\sigma-1} (E_{mt} / P_{mt}^{1-\sigma})$$
(1)

The *q*, *E*, *P*, *p*,  $\lambda$  represents the quantity of product consumption, consumer expenditure, and price index. Product price and product quality are the alternative elasticities between product categories greater than one and are linearised and rewritten as:

$$\ln q_{jimt} = \ln E_{mt} - (1 - \sigma) \ln P_{mt} - \sigma \ln p_{jimt} + \varepsilon_{jimt}$$
(2)

Among them,  $\varepsilon = (\sigma - 1) \ln \lambda_{jimt}$ . The deformation of residual items can obtain the quality of product *j* exported by enterprise *i* to *m* country in *t* year:

$$Quality_{jimt} = \ln \lambda_{jimt} = \varepsilon_{jimt} / (\sigma - 1) = (\ln q_{jimt} - (1 - \sigma) \ln \frac{\hat{q}}{jimt}) / (\sigma - 1)$$
(3)

In the actual estimation, considering the interaction of horizontal categories of products and the two-way causality between products and prices, this study used the method of Khandelwal (2010) to add the product category of GDP control level in the province in which the enterprise is located. Using the methods of Nevo and Whinston (2010), the average price of exports from countries other than m countries was estimated using enterprise *i* as a tool variable for *i*'s export prices in *m* countries. Referring to the practice of Amiti and Khandelwal (2013), the fixed effect of both cross-sections ( $v_i$ ) and time dimension ( $v_t$ ) and common time trend ( $v_c$ ) were controlled, and the specific regression model is as follows:

$$\ln q_{jimt} = v_i + v_t + v_c + \ln E_{mt} - (1 - \sigma) \ln P_{mt} - \sigma \ln p_{jimt} + \text{controls}_{_{jimt}} + \varepsilon_{jimt} \quad (4)$$

where, *controls* represents control variables of product category and export price in destination country.

#### 3.2.2. Trade policy uncertainty

Three main measures of trade policy uncertainty exist. One is the different method used by Pierce and Schott (2016) to measure export trade uncertainty using the difference between general trading partners (NTRs) and non-general trading partners (non-NTRs). Second is the direct differential method of Groppo and Piermartini (2014) which holds that if a country is a member of the WTO, trade policy uncertainty is the difference between bound and Most-favored nation (MFN) tariffs. If a country has signed rtA trade 1006 👄 H. SUI ET AL.

policies, uncertainty is the maximum difference between preferential and MFN tariffs. The third is the Handley and Limao (2017) approach, which calculates the trade policy uncertainties that China faced after it acceded to the WTO:

 $TPU=1-(T/MFN)^{\sigma}/(\sigma-1)$ , where T and MFN represent preferential and MFN tariffs, respectively, for import substitution flexibility, usually valued in the literature as 3. The first two methods are simple and intuitive but do not consider the product substitution elasticity, for the tax rate also lacks detail, more roughly. The third method overcomes these problems and is widely used in the existing literature (Wang et al., 2020). A similar approach was used in this study, drawing on the framework for calculating trade policy uncertainty based on Handley and Limão (2017):

$$TPU = \begin{cases} 1 - \left(\frac{\tau_{mfn}}{\tau_{bound}}\right)^{\sigma}, \text{ before} \\ 1 - \left(\frac{\tau_{p}}{\tau_{mfn}}\right)^{\sigma}, \text{ after} \end{cases}$$
(5)

Among them are  $\tau_{mfn}$  MFN tariffs for the WTO,  $\tau_{bound}$  binding tariffs for the WTO,  $\tau_p$ , and preferential tariffs for China's ASEAN Free Trade Area. Learn from Facchini, Liu, Mayda, and Zhou (2019), Set  $\sigma$ =3, and calculate the uncertainty based on the weighted tax rate on the proportion of exports provided by the WITS database *WTPU\_3*. The measurement analysis in this study is mainly based on this indicator. To improve the robustness and credibility of the results, we provided a basis for some of the tests  $\sigma$ = 3 average tax rate calculation A*TPU\_3* and based on  $\sigma$ =2 the weighted tax rate calculation results *WTPU\_2*.

The trade uncertainty difference was ranked as 45%, 50%, and 55% of the three thresholds dividing the treatment and control groups, respectively, to find a good parallel trend in treatment and control groups, using the total trade policy uncertainty of cities before 2010 minus the total trade policy uncertainty of cities after 2010. To visually examine product quality trends, as shown in Figure 3. It can be seen that the three *TPU* corresponding sample groupings with a threshold of 55% meet the parallel trend hypothesis. Therefore, this study sets the cities with trade policy uncertainty difference greater than the threshold as the experimental group and the cities with less than the threshold as the control group and generates three virtual variables of the experimental group, *Wtreat3, Atreat3, and Wtreat2*, based on the three uncertainties of *WTPU\_3, WTPU\_2*, and *ATPU\_3* respectively.

Set the time virtual variable to *post*, post = 0 before 2010, post = 1 after 2010. The experimental group virtual variables were multiplied by the time virtual variables, and the double differential variables were constructed *Did\_3*, *Did\_A3*, and *Did\_2*. Table 1 presents the specific meanings of the key variables.

#### 3.2.3. Social capital

Limited to access, early studies on social capital used more cross-sectional data. Zhang and Ke (2002) used the trust level of business survey data to measure the level of social capital, and Pan (2009) used blood donation data as a measure. However, the above data are provincial cross-sectional and cannot be used in panel estimates. In a recent study, Zhou, Jing, and Sui (2018) used the total amount of donations to measure the level of social capital, this indicator in the "Civil Affairs



Figure 3. Visual inspections of hypothetical parallel trends.

Table 1. The meaning table of key variables.

	Weighted tax rate	Average tax rate
<i>σ</i> =2	WTPU_2; Wtreat2; Did_2	
<i>σ</i> =3	WTPU_3; Wtreat3; Did_3	Atreat_3; Did_A3

Statistics Yearbook" has continuous statistics, better solving the problem of panel data construction. However, at the urban level, donation data are not available. This study draws on similar ideas, using the number of civil society organisations per 10,000 people to measure the overall level of social capital ( $Sc_total$ ). This indicator can reflect the relationship mechanism between individuals and groups and the constraints of organisations on individuals, organisations, and civil society organisations, which are also important factors guiding social values. Therefore, it can better depict social capital's "system" attribute. This indicator has continuous statistics in the rating database of Chinese nonprofit organisations, and panel data at the city level can be obtained.

#### 3.3. Estimation model and data

As a benchmark return, we first tested the impact of the decline in trade policy uncertainty on the quality of export products. The two methods of double differential and fixed effects were used to ensure the reliability of the regression results and to estimate, and the basic model was set as follows:

$$Quality_{imit} = \beta_0 + \beta_1 Treat_i + \beta_2 post_i + \beta_3 Did_{it} + \beta_4 Controls_{ikt} + \varepsilon_{imit}$$
(6)

where *i* represents the enterprise, *k* represents the city. *Quality* for export product quality, *t* for time virtual variables, *Treat* for three sets of experimental group virtual variables, *Did* is multiplicity *Treat*  $\times$  *t*, and  $\varepsilon$  is a perturbation item. *Controls* are a collection of control variables, including age (*Corporation\_age*), GDP per capita in cities, openness in cities, government intervention, urbanisation (*City\_scale*), total urban exports (*Car\_volume*), average wages (*Wage*), loan balances (*Loan\_balance*), diplomatic relations between importing countries, and the territory of importing countries.

Next, we tested the regulating role of social capital, constructed *Did\*Sc\_total*, multiplied the *Did* variable and social capital, and carried out the triple differential test; the model is set as follows:

$$Quality_{jmit} = \beta_0 + \beta_1 Treat_i + \beta_2 post_t + \beta_3 Did_{it} + \beta_4 Did * Sc_{ikt} + \beta_5 Controls_{ikt} + \varepsilon_{jmit}$$
(7)

If  $\beta_4$  significantly differs from zero, it shows that social capital can regulate the role of trade policy uncertainty.  $\beta_4 > 0$  shows that social capital strengthens the role of the decline in trade policy uncertainty, and  $\beta_4 < 0$  shows that social capital reduces the role of trade policy uncertainty.

The indicators required to calculate the export product of quality match data from the Chinese Industrial Enterprises and Chinese Customs Databases, and the outlier values were excluded using the method of Brandt, Van Biesebroeck, and Zhang (2009). The data required for the calculation of trade uncertainty come from the WLTS database, social capital data from the China Civil Society Organization Rating Database, and the city level data come from the "China Urban Statistics Yearbook". Given the integrity of the data, the sample interval was selected from 2006–2013. Table 2 summarises the variables' measurements and data sources:

#### 4. Regression results

#### 4.1. Baseline regression

Table 3 reports the test results of the impact of the decline in trade uncertainty on the quality of export products. Column (1)-(3) is the test results grouped by *Wtreat\_3*. Column (1) and column (2) report the regression results after excluding control variables and adding control variables, respectively, and the role of  $Did_3$  is strongly positive, indicating that the decline in trade policy uncertainty has significantly improved the quality of China's exports. To avoid the effects of a particular product and year, column (3) controls the two-way fixed effect of the product and year and re-estimates using the fixed-effect model that the absolute value of the  $Did_3$ 's coefficient of action has decreased. However is still significantly positive, with a strength of approximately 3.25 percent. As a reference, columns (4)-(6), (7)-(9) reported the results of the *Wtreat\_2* and *Atreat\_3* based tests, respectively, and the results of the  $Did_2$  and  $Did_A3$  were significantly positive except (9).

Variables		
name	Measure	Source
Quality	Quality of product HS6 <i>j</i> exported to country <i>m</i> by firm <i>i</i> at year	Matched data of Chinese Industrial Enterprises Database and Chinese Customs Database
TPU	Weighted tariff changes considering the elasticity of substitution before and after the establishment of China-ASEAN Free Trade Agreement	WLTS
Sc	Number of civil society organizations per 10,000 people	China Civil Society Organization Rating Database
Network	Number of mobile phone registrations	China Urban Statistics Yearbook
Code	Whether it is a civilized city	China Civilization Network
Value	social responsibility of enterprises	Run-ling global CSR Rating Database
Innovation	Number of firm patents	China Patent Database
Firmage	Firm age	Chinese Customs Database
Averagegdp	City level GDP per capita	Statistical Yearbook of Chinese Cities
Openess	Ratio of total trade and FDI over GDP	Statistical Yearbook of Chinese Cities
Government	Ratio of government expenditure over GDP	Statistical Yearbook of Chinese Cities
City_scale	Population of city	Statistical Yearbook of Chinese Cities
Freightvolume	Freight volume of city	Statistical Yearbook of Chinese Cities
Urban	Ratio of urban population over population	Statistical Yearbook of Chinese Cities
Wage	Average wage of city	Statistical Yearbook of Chinese Cities
Loanbalance	Loan balance of city	Statistical Yearbook of Chinese Cities
Priceindex	CPI	Statistical Yearbook of Chinese Cities
Total_export	Total export of city	Statistical Yearbook of Chinese Cities
Diplomatic	Has international sister city or not	Statistical Yearbook of Chinese Cities
Territory	Territory of city	Statistical Yearbook of Chinese Cities

lable 2. Variables measurements and	data d	sources
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Note: The definitions and measurement of the variables are consistent with the literature.

Upon comparing the results of the *Wtreat3* and *Wtreat2* groups, it was found that when the substitution elasticity was 2, the estimated value of the uncertainty was smaller. This is because lower substitution elasticity inhibits the transmission of the effect of the TPU decrease (indicated by product tariff reduction) across products, resulting in an underestimation of the regression results.

Upon comparing the results of the *Atreat3* grouping, it can be seen that the coefficient of *Did* is significantly higher than that of the *Wtreat3* grouping when time and cross-section fixed effects are not controlled. This is because products with a small trade volume tend to achieve a large tariff cut; the calculation method that takes the arithmetic average may lead to overestimation because it includes the difference between the groups. The effect of TPU is no longer significant when controlling for the fixed effects of time and cross-section, proving that the effect of the previous two estimates is precisely the overestimation caused by the differences between the groups.

Most existing studies adopt *Wtreat3*. *Wtreat2* and *Atreat3* did not improve the measurement accuracy but only provided a rough reference for comparing the main explanatory variables. The results of *Atreat3* are inconsistent with the regression results of *Wtreat3* in Table 3(9), and the direction and significance of *Did* coefficients in the other estimations are consistent, which can indirectly verify the robustness of the

		Wtreat3			Wtreat2			Atreat3	
Variables	(1)	(2)	(3)	(4)	(5)	(9)	(2)	(8)	(6)
Did	0.055***	0.054***	0.042***	0.105***	0.071***	0.028**	0.081***	0.094***	0.005
	(0.015)	(0.016)	(0.013)	(0.015)	(0.015)	(0.013)	(0.016)	(0.017)	(0.014)
Innovation		0.009	0.032***		0.002	0.024**		0.027**	0.025**
		(0.013)	(0.011)		(0.012)	(0.011)		(0.013)	(0.011)
Firmage		-0.005***	0.040***		-0.005***	0.040***		-0.005***	0.038***
		(0.001)	(0.014)		(0.001)	(0.014)		(0.001)	(0.014)
Averagegdp		-0.154***	-0.026		-0.153***	-0.025		-0.131***	-0.031
		(0.015)	(0.021)		(0.015)	(0.022)		(0.015)	(0.021)
Openess		-0.599***	-0.079		-0.594***	-0.021		-0.609***	-0.027
		(0.057)	(0.094)		(0.057)	(0.093)		(0.057)	(0.093)
Government		-1.660***	0.073		-1.742***	0.125		-1.733***	0.188
		(0.155)	(0.362)		(0.154)	(0.361)		(0.152)	(0.366)
Cityscale		0.054***	-0.031		0.037***	-0.050		0.067***	-0.076
		(0.012)	(0.105)		(0.012)	(0.104)		(0.012)	(0.104)
Freightvolume		-0.062***	0.018		-0.053***	0.025		-0.080***	0.017
		(0.008)	(0.017)		(0000)	(0.017)		(0000)	(0.017)
Urban		-0.136***	-0.018		-0.121***	-0.020		-0.138***	-0.020
		(0.020)	(0.048)		(0.020)	(0.048)		(0.020)	(0.048)
Aveeragewage		0.000***	0.000***		0.000***	0.000***		0.000***	0.000***
		(000.0)	(0000)		(0000)	(0000)		(0000)	(0000)
Loanbalance		0.000	0.000***		0.000	0.000***		-0.000	0.000**
		(000.0)	(0000)		(0000)	(0000)		(0000)	(0000)
Priceindex		0.012***	-0.008		0.011***	-0.008		0.013***	-0.011**
		(0.002)	(0.006)		(0.002)	(0.006)		(0.002)	(0.005)
Total export		0.000***	0.000***		0.000***	0.000***		0.000***	0.000***
		(000.0)	(0000)		(0000)	(0000)		(0000)	(0000)
Diplomatic		-0.004***			-0.004***			-0.004***	
		(000.0)			(0000)			(0000)	
									(Continued)

Table 3. The effect of the uncertain decline in trade policy on the quality of export products.

Atreat3	(6) (7) (8) (9)	0.000***	(0.000)	0.432 -0.099*** 8.955*** 1.031	(0.854) (0.010) (0.776) (0.815)	yes yes yes	yes Yes	yes Yes	0.027 0.001 0.019 0.027	124,983 126,229 124,983 124,983
Wtreat2	(5)	0.000***	(0000)	9.325***	(0.774)	yes			0.019	124,983
	(4)			-0.083***	(0.007)				0.001	126,229
	(3)			0.408	(0.835)	yes	yes	yes	0.027	124,983
Wtreat3	(2)	0.000***	(0000)	9.195***	(0.774)	yes			0.019	124,983
	(1)			-0.093***	(0.006)				0.001	126,229
	Variables	Territory		Constant		Controls	Individual effects	Time effects	R-square	Observations

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regression results. The above results show that the establishment of the China-ASEAN regional trade framework has significantly improved the quality of export products under the group measurement of different trade policy uncertainties.

This conclusion is similar to the findings of Wang et al. (2020); the decline in regional trade policy uncertainty has a positive effect on improving the quality of export products. After the official launch of the China-ASEAN Free Trade Area in 2010, the quality of export products of urban enterprises with high trade policy uncertainty increased significantly faster than that of low-uncertainty areas. This is because a decline in trade policy uncertainty stimulates corporate innovation (Mao & Xu, 2018), and a more pronounced decline in risk in high-uncertainty areas encourages companies to devote more resources to product development. Additionally, the decline in China-ASEAN trade policy uncertainty has contributed to the rapid development of agricultural trade and the adjustment of agricultural sector production. It has accelerated the transfer of production resources to the non-agricultural sector and deepened the division of labour, thereby improving the quality of export products (Zhou, Hu, Wu, & Cui, 2006).

#### 4.2. Role of social capital

#### 4.2.1. Test of the regulatory effect of social capital

Table 4 reports the results for the regulatory effects of social capital on the study variables. Based on the test results of Thereat3 grouping, as shown in columns (1) and (2), *Did* and the city social capital *Sc's* crossover item *Did\*sc* coefficients are robustly positive. This indicates that social capital strengthens the positive effect of the establishment of the China-ASEAN Free Trade Area on the quality of export products. This may be because, as mentioned earlier, relationship-based social capital combines technology and human resources through social networks to accelerate technology and product innovation. Binding social capital improves economic organisation and governance through the normative constraints of individuals, enterprises, and industries. It improves the ability of enterprises to respond to changes in the trading environment. Value-guided social capital reduces opportunism by shaping corporate social responsibility and strengthens enterprises' product quality objectives. To improve the robustness of the results, columns (3)–(6) report the test results based on *Wtreat2* and *Atreat3*. The role of social capital remained significantly positive, consistent with the estimates based on the Wetreat3 grouping.

#### 4.2.2. Testing the mechanism of social capital

To clarify the mechanism of social capital and further improve the empirical logic, this study examines the function of the relationship, restraint, and value guidance mechanisms from the functional viewpoint of social capital. Using Baron and Kenny's (1986) two-step approach, the identification strategy is as follows:

$$Mediate\_n_{it} = \alpha_1 + \alpha_2 \times Sc\_total_{it} + \delta_2 \times Control_{it} + \varepsilon_{it}$$
(8)

$$Quality_{jmit} = \beta_0 + \beta_1 Did_{it} + \beta_2 Did_{it} * Mediate_{nit} + \beta_3 Cnotrols_{ikt} + \varepsilon_{jmit}$$
(9)

Variables	Wtr	eat3	Wtr	eat2	Atre	at3
	(1)	(2)	(3)	(4)	(5)	(6)
Did	-0.070**	-0.039	-0.068**	-0.076**	-0.079***	-0.063*
	(0.025)	(0.029)	(0.023)	(0.026)	(0.021)	(0.026)
Did*Sc	0.026***	0.021**	0.028***	0.030***	0.022***	0.018**
	(0.005)	(0.007)	(0.005)	(0.006)	(0.004)	(0.006)
Innovation		0.038***		0.037***		0.033**
		(0.011)		(0.011)		(0.011)
Firmage		0.038**		0.037**		0.035*
		(0.014)		(0.014)		(0.014)
Averagegdp		0.003		0.015		-0.004
		(0.023)		(0.023)		(0.023)
Openess		-0.095		-0.045		-0.046
		(0.094)		(0.093)		(0.093)
Government		0.203		0.245		0.325
		(0.364)		(0.362)		(0.369)
Cityscale		-0.064		-0.092		-0.181
		(0.105)		(0.105)		(0.109)
Freightvolume		0.023		0.039*		0.019
		(0.017)		(0.017)		(0.017)
Urban		-0.009		-0.019		-0.014
		(0.049)		(0.048)		(0.049)
Aveeragewage		0.000		0.000		0.000*
		(0.000)		(0.000)		(0.000)
Loanbalance		0.000***		0.000***		0.000**
		(0.000)		(0.000)		(0.000)
Priceindex		-0.006		-0.004		-0.010
		(0.006)		(0.006)		(0.005)
Total export		0.000*		0.000		0.000**
		(0.000)		(0.000)		(0.000)
Constant	-0.229***	0.108	-0.228***	-0.147	-0.229***	1.331
	(0.007)	(0.840)	(0.007)	(0.863)	(0.007)	(0.820)
Controls		yes		yes		yes
Individual effects	yes	yes	yes	yes	yes	yes
Time effects	yes	yes	yes	yes	yes	yes
R-square	0.026	0.027	0.027	0.028	0.027	0.027
Observations	126,229	124,983	126,229	124,983	126,229	124,983

Table 4. Test of the regulatory role of social capital.

Note: Standard errors are clustered at plant level; \* significant at 10%; \*\* significant at 5%, \*\*\* significant at 1%. For detailed data definitions and sources see Table 2 and Appendix Table A1.

Among them, *Mediate\_n<sub>it</sub>* for three types of mediation variables, n-1, 2, and 3, represent social networks, codes of conduct, and value. If  $\beta_1$  and  $\alpha_2$  simultaneously have significance, then the intermediary mechanism is established.

The social network shaped by the relationship mechanism in social capital has an important influence on the economic organisation and operation mode. It can have a regulating effect on the influence of changes in the external environment. In recent years, the rapid development of smart phones and social apps has completely changed the modern way of socialising. Mobile phones have become the main means of modern

socialising, so this study uses the number of mobile phone registrations in the sample area as the proxy variable of the social network (*Network*), the relevant data from the 2006–2013 China Urban Statistics Yearbook. In Table 5, panel A reports the test results of the related mechanism. Columns (1)-(3) show that social capital significantly increased the degree of social networking, and column (4) shows that social networks have a positive regulatory effect on the consequences of changes in the trading environment. The results show that the relationship mechanism is an adjustment mechanism of social capital, which strengthens the positive effect of the decline in trade policy uncertainty on the quality of export products through the contact mechanism.

Furthermore, the hidden constraints provided by social capital can improve the degree of behavioural norms, which can affect the effect of policy transmission. This article uses whether it is a civilised city to measure the degree of code of conduct in a region (*Code*), which is from "China Civilization Network". Only in the years since it was rated as a civilised city Code = 1, a sample of observation points before being rated as a civilised city, and never rated as a civilised city Code = 0. Table 5 panel B reports the test results of the restraint mechanism. The first stage of the test results shows that the role of social capital on the code of conduct is significantly positive; the second stage shows that the behavioral norms strengthen the decline in trade policy uncertainty on the quality of export products. The above results show that social capital strengthens the role of trade policy uncertainty by improving behavioural norms and confirms the restraint mechanism of social capital.

	Panel A: Relation	nship mechanism		
Variables	OLS (1)	FE (2)	RE (3)	Quality (4)
	Panel B: Restra	int mechanism		
Variables	OLS	FE	RE	Quality
	Panel C: Value gui	idance mechanism		
Variables	OLS	FE	RE	Quality
Sc	0.611***	0.384***	0.585***	
	(0.002)	(0.005)	(0.002)	
Did				-0.096**
				(0.045)
Did*Network				0.024***
				(0.008)
Controls	yes	yes	Yes	yes
Individual effects		yes	Yes	yes
Time effects		yes	Yes	yes
R-square	0.543	0.089	0.543	0.027
Observations	126,708	126,708	126,708	124,147

Table 5. The results of the test of the mechanism of social capital action.

Note: Standard errors are clustered at plant level; \* significant at 10%; \*\*\* significant at 5%, \*\*\* significant at 1%. For detailed data definitions and sources see Table 2 and Appendix Table A1.

The value guidance function of social capital can optimise the target selection of enterprises and improve their enthusiasm to improve product quality. This study examines the role of social capital in the value guidance mechanism by measuring enterprises' value orientation through social responsibility in a global CSR rating database. As shown in panel C of Table 5, social capital significantly improved the social responsibility of enterprises in the first phase of the test, indicating that social capital has a value-guiding function. However, the second test results did not find evidence that value orientation had a positive effect on export product quality. To ensure the robustness of the results, we further reexamined the value guidance mechanism using the Sobel method and found that the results were not statistically significant. The reason may be that the purpose of social responsibility of some enterprises is to establish a social image. The publicity effect is greater than the behavioural effect and does not have a real impact on the behaviour of enterprises.

#### 4.3. Diagnostic tests

#### 4.3.1. Parallel trend hypothesis test

The application of the DID test requires that the treated and control groups exhibit a parallel trend. The exact test results assumed by parallel trends are listed in Table 6. Columns 6(1)-(3) are listed as the test results when social capital is not added, *Wtreat3* is similar to the intuitive forecast results, the weighted tax rate calculation of the grouping in the policy period and after the coefficients are significant, passed the parallel trend test. The experimental and control groups based on *Wtreat2* had significant differences in the quality of export products before the establishment of the FTA and did not meet the parallel trend. The two subsamples based on Atreat3 showed no significant difference in product quality before and after the establishment of the FTA, and the settings of the experimental and control groups did not meet the comparative requirements of natural experiments. Figures 4(a-c) visually show the movement of differences between groups over time, with the *Wtreat3* grouping showing a good parallel trend, whereas *Wtreat2* and *Atreat3* groupings failed the parallel trend test. This diagnostic test result indicates that the *Wtreat3* grouping is more suitable for DID estimation than the other two groups, which may be one of the reasons for its better results.

Considering the role of social capital, a city with a social capital score greater than the average is assigned the value one; otherwise, zero, and a parallel trend hypothesis test of the triple difference is carried out. Results as shown in Tables 6 (4)–(6) and Figure 4(d-f), the *Wteat3* cluster still meets parallel trends, and the differences between groups after the establishment of FTA are more pronounced. The differences between groups before *Wteat2* weakened and passed the parallel trend hypothesis test; the differences between groups after *Ateat3* were still not significant but significantly enhanced. The improvement in the parallel trend partly verifies the judgment of this study on the role of social capital regulation.

#### 4.3.2. Cyclic placebo test

The establishment of the FTA is not a randomised trial; this study draws on the method of Li et al. (2016) for the circular placebo test to avoid the systematic bias of the estimation results caused by the setting of the experimental group. The experimental group was randomly selected for the placebo test, and the coefficient distribution for 500 cycles is shown in Figure 5. It can be seen that the coefficient of 500 circulating placebo

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#### Table 6. Parallel trend test.

	Not in	cluded in social	capital	In	cluded social capi	tal
Variables	Wtreat3 (1)	Wtreat2 (2)	Atreat3 (3)	Wtreat3 (4)	Wtreat2 (5)	Atreat3 (6)
Before3	0.016	0.025	-0.001	0.055	-0.001	-0.009
	(0.023)	(0.021)	(0.026)	(0.042)	(0.025)	(0.027)
Before2	0.024	0.051**	-0.013	0.066	0.012	0.008
	(0.025)	(0.022)	(0.023)	(0.047)	(0.024)	(0.028)
Before1	0.037	0.063**	-0.021	0.064	0.033	-0.003
	(0.027)	(0.025)	(0.022)	(0.043)	(0.026)	(0.028)
Current	0.063**	0.072***	0.013	0.147***	0.098***	0.023
	(0.027)	(0.023)	(0.024)	(0.045)	(0.029)	(0.027)
After1	0.069**	0.078***	-0.008	0.128**	0.068***	-0.026
	(0.028)	(0.024)	(0.020)	(0.050)	(0.025)	(0.029)
After2	0.046	0.053**	-0.024	0.133***	0.073***	0.028
	(0.029)	(0.026)	(0.021)	(0.050)	(0.024)	(0.030)
After3_	0.049*	0.082***	0.001	0.139***	0.088***	0.027
	(0.029)	(0.027)	(0.019)	(0.052)	(0.023)	(0.032)
Constant	1.157	1.130	1.362	0.861	0.624	1.934**
	(0.844)	(0.892)	(0.838)	(0.863)	(0.865)	(0.892)
Controls	yes	yes	yes	yes	yes	yes
Individual effects	yes	yes	yes	yes	yes	yes
Time effects	yes	yes	yes	yes	yes	yes
R-square	0.027	0.028	0.027	0.028	0.028	0.027
Observations	123,996	123,996	123,996	123,996	123,996	123,996

Note: Standard errors are clustered at plant level; \* significant at 10%; \*\* significant at 5%, \*\*\* significant at 1%. For detailed data definitions and sources see Table 2 and Appendix Table A1.



Figure 4. Parallel trend graphs.

tests is standard normal distribution, which meets the characteristics of random distribution, and no treatment effect is found, indicating that there is no systematic bias in the estimation of this study.

#### 4.4. Robustness tests

#### 4.4.1. PSM-DID inspection

Total assets, total liabilities, research and development investment, taxes, total profits, total industrial output value, the total number of employees, total exports, and enterprise age were selected to minimise the selection bias of the sample. The control group was reconstructed using PSM to match the enterprise one-to-one. Table 7 reports the regression results of PSM-DID. The coefficients of *Did* in the three types of uncertainty measurements in columns (1)–(3) are strongly positive, and the direction and significance of the *Did*\*Sc\_total coefficient in columns (4)–(6) are consistent with the regression of the baseline.

#### 4.4.2. Sample processing

This section considers the heterogeneity between cities and deletes special samples at the sub-provincial level. Sub-provincial cities are under the direct jurisdiction of the State Council, with large economies and populations, and there are obvious differences between the samples of ordinary cities at the local level regarding policy preferences, resource advantages, and economic development levels. Therefore, this study deletes the sub-provincial cities and repeats the above regression, as shown in Figure 6. It can be seen that there is no fundamental change in the regression coefficient as a whole, the coefficients at the *Wtreat3* and *Wtreat2* levels are stable, and only the three sample points in Hangzhou, Guangzhou, and Shenzhen at the *ATreat3* level fluctuated. The remaining sample points did not change significantly, indicating that the special values of the city had no effect on the statistical results. In addition, the curve on the right is significantly smoother than that on the left, which also confirms the regulatory effect of social capital on policy transmission.



Figure 5. Cyclic placebo test.

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Variables	Wtreat3 (1)	Wtreat2 (2)	Atreat3 (3)	Wtreat3 (4)	Wtreat2 (5)	Atreat3 (6)
Did	0.085***	0.124***	0.132***	-0.033	-0.012	-0.098**
	(0.024)	(0.023)	(0.026)	(0.047)	(0.042)	(0.040)
Did*Sc				0.016*	0.017*	0.023***
				(0.009)	(0.009)	(0.008)
Post	-0.126**	-0.152**	-0.193**	0.105**	0.092***	0.124***
	(0.014)	(0.016)	(0.022)	(0.013)	(0.014)	(0.019)
Treat				-0.015	-0.034**	-0.050***
				(0.014)	(0.014)	(0.016)
Controls	yes	yes	yes	yes	yes	yes
Individual effects	yes	yes	yes	yes	yes	yes
Time effects	yes	yes	yes	yes	yes	yes
R-square	0.002	0.002	0.362	0.010	0.010	0.010
Observations	51,529	51,529	51,529	51,529	51,529	51,529

#### Table 7. PSM-DID inspection.

Note: Standard errors are clustered at plant level; \* significant at 10%; \*\* significant at 5%, \*\*\* significant at 1%. For detailed data definitions and sources see Table 2 and Appendix Table A1.

#### 4.4.3. Impact of the global financial crisis

This study controls for the impact of the 2008 financial crisis in the time dimension. The global financial crisis of 2008 had a significant impact on international trade. In the visual inspection of the hypothetical parallel trend, we also found that the quality of China's export products declined after 2008. This study constructs the virtual variable  $t_2008$  in 2008 and re-tests it in the model to control for the influence of this fact. The results are shown in Table 8. It can be seen that the regression results are consistent with the previous, *Did* and *Did\*Sc's* coefficient of action is still significantly positive. The latter's role increases significantly from 1.61% to 1.92% at the Wtreat3 level. The severity also moderately significantly changed to strong. This shows that, after considering the impact of the global financial crisis, the role of social capital regulation is further enhanced.



Figure 6. The coefficient line chart after deleting the sub-provincial cities in turn.

Variables	Wtreat3	Wtreat2	Atreat3	Wtreat3	Wtreat2	Atreat3
Did	0.045***	0.072***	0.093***	-0.044	-0.059**	-0.059**
	(0.016)	(0.016)	(0.017)	(0.029)	(0.025)	(0.026)
Did_*Sc				0.019***	0.026***	0.015***
				(0.007)	(0.006)	(0.006)
Controls	yes	yes	yes	yes	yes	yes
t_2008	yes	yes	yes	yes	yes	yes
Individual effects	yes	yes	yes	yes	yes	yes
Time effects	yes	yes	yes	yes	yes	yes
R-square	0.019	0.019	0.019	0.027	0.027	0.027
Observations	124,147	124,147	124,147	124,147	124,147	124,147

#### Table 8. Impact of the global financial crisis.

Note: Standard errors are clustered at plant level; \* significant at 10%; \*\* significant at 5%, \*\*\* significant at 1%. For detailed data definitions and sources see Table 2 and Appendix Table A1.

#### 5. Conclusions

Trade policy uncertainty is an important institutional factor that affects enterprises' export behaviour. However, in regions with similar degrees of economic development and identical formal systems, the changes in the quality of enterprises' export products showed obvious differences when the uncertainty of trade policy decreased. This study provides new insights for elucidating this phenomenon, starting with an informal system of social capital. Social capital has a hidden institutional role, shaping and influencing economic behaviour through the role of relationships, limitations, and value guidance, which leads enterprises to react differently to trade policy changes. Using the natural experiment established by the ACFTA, this study first explored the overall influence of the uncertain decline of trade policy on the quality of export products. It further highlighted the importance of social capital in changing trade policy. The study found that a decrease in trade policy uncertainty significantly improves the quality of export products. This reflects that after the official launch of the China-ASEAN Free Trade Area in 2010, the quality of export products of urban enterprises with high trade policy uncertainty increased significantly faster than in low-uncertainty areas. This encouraged companies to devote more resources toward enhancing the quality of the product.

Furthermore, social capital is also found to positively strengthen the effect of establishing the China-ASEAN Free Trade Area on the quality of export products. It brings together technology and human resources by enhancing social networks to boost technology and product innovation. The regulatory and mechanism tests are further employed to illustrate the phenomenon clearly by using the relationship, restraint, and value guidance mechanisms. The findings revealed that social capital strengthens the positive effect of the decline in trade policy uncertainty on the quality of export products, as social networks modify the relationship mechanism, influence the economic organisation and their operation modes, and ultimately regulate the external environment. The results in the context of hidden constraints also revealed that social capital improves the degree of behavioural norms, influencing the spread of policy. Similarly, the value guidance function of social capital was also found to optimise the target selection of enterprises and improve their enthusiasm for improving product quality. The PSM-DID was also employed for robustness checks, which further endorses the consistency of the results. 1020 👄 H. SUI ET AL.

These findings have important policy implications. First, the establishment of a regional trade framework will help reduce the uncertainty of trade policies and promote the improvement of export product quality. With the rise of trade protectionism and the decline of the global trade framework, promoting a shift in trade from the global to the regional framework through regional trade liberalisation can effectively mitigate the impact of the rapidly deteriorating external environment and strive to adjust the competitiveness of export enterprises. Second, while vigorously promoting the remodeling of formal economic and trade relations, the "informal" social capital system provides another powerful adjustment tool. Social capital exists widely in all aspects of economic activity and has an important regulatory effect on the impact of changes in trade policy uncertainty. Active guidance and nurturing of social capital will help improve and strengthen the practical effects of formal institutional initiatives. Third, the mechanism of action results showed that relationship and restraint mechanisms are the two main channels for the transmission of the uncertainty of the influence of social capital on trade policy. The poor function of the value guidance mechanism shows that current social capital does not yet have the educational function of influencing individual self-restraint, and the mechanism does not exceed the "exogenous" institutional function.

#### Data availability statement

The study data will be available on request.

#### **Disclosure statement**

No potential conflict of interest was reported by the author(s).

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Variables	Ν	Mean	Std. dev.	Min.	Max.
Quality	126,229	-0.122	1.296	-7.666	5.66
rQuality	126,229	0.513	0.185	0	1
Sc	126,708	3.558	1.461	0	6.537
Network	126,708	0.446	0.562	0.000604	3.663
Code	126,708	0.583	0.493	0	1
Value	84,528	3.581	0.210	2.847	4.237
Innovation	126,708	0.608	0.488	0	1
Firmage	126,708	12.17	7.494	0	63
Averagegdp	126,708	10.87	0.573	8.507	12.79
Openess	126,708	0.147	0.107	0.000219	0.472
Government	126,708	0.119	0.0444	0.0427	0.423
City_scale	126,708	6.352	0.662	4.409	8.119
Freightvolume	126,708	9.944	0.924	6.565	11.88
Urban	126,708	0.625	0.309	0.0672	1
Wage	125,640	44,694	17,114	11,099	93,997
Loanbalance	126,708	102,000	11,160	555.462	443,600
Priceindex	126,530	102.92	1.987	97.700	108.5
Total_export	126,708	258,900	319,000	0.448	1,650,000
Diplomatic	126,708	1,971	14.490	1,950	1,991
Territory	126,708	53.09	61.560	0.0714	192

Appendix

	Tw	Two-sided tail-down inspection				Expected effect test			
Variables	Explanatory variable		Explained variable		t = 2007		t = 2009		
Did_3	0.045***	-0.032	0.039***	-0.020	0.000	-0.004	0.003	-0.001	
	(0.016)	(0.029)	(0.015)	(0.027)	(0.003)	(0.005)	(0.002)	(0.004)	
Did_3*Sc		0.016**		0.014**		0.001		0.001	
		(0.007)		(0.006)		(0.002)		(0.001)	
Controls	yes	yes	yes	yes	yes	yes	yes	Yes	
Individual effects	yes	yes	yes	yes	yes	yes	yes	Yes	
Time effects	yes	yes	yes	yes	yes	yes	yes	Yes	
R-square	0.018	0.027	0.018	0.024	0.026	0.026	0.026	0.026	
Observations	84,772	84,772	84,772	84,772	124,147	123,996	124,147	123,996	

Table A2.	Two-sided	tailings and	expected	effect	testing.

Standard errors are clustered at plant level; \* significant at 10%; \*\* significant at 5%, \*\*\* significant at 1%. For detailed data definitions and sources see Table 2 and Appendix Table A1.

#### Two-sided tailings

In order to avoid the influence of outlier values, this paper performs a 5% two-sided tailing test of the explanatory variables and the core explanatory variables, and the results are shown in columns (1)-(4) of Table A2. After two-sided tailing of explanatory variables, the level of significance of key variables is basically the same as that of benchmark regression, and the coefficient size decreases slightly, indicating that after the establishment of the China-ASEAN Free Trade Area, the uncertainty decreased more in cities, and the level of export product quality improvement was higher. However, the direction and significance of the overall results were not affected, indicating that the results remained robust. The results after the two-sided contraction of export product quality are similar to those after the contraction of trade policy uncertainty.

#### **Expected** effect

The absence of expected effects is another important prerequisite for the DID approach. The formal establishment of the China-ASEAN Free Trade Area has undergone a long period of demonstration and preparation, and has been signed in the process of advance (Framework Agreement on Comprehensive Economic Cooperation between China and ASEAN), (Trade in goods agreements), (Trade in services agreements), strong policy expectations may be formed. This paper uses the year before the FTZ was formally established (2009) as the impact time to reexamine the above tests to verify that there is an expected effect, as shown in Table A2 columns (5) and (6).  $Did_3$  and  $Did_3*Sc_total$  are not significant, indicating that there is no expected effect. To improve the robustness of the results, we also provide pseudo regression results for the year before the subprime crisis (2007), as shown in columns (7) and (8). The coefficients of the key variables are still not significant and there is no expected effect.