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Services Liberalization and Export Quality: Evidence from China

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Abstract

Using firm-level export data from China, this paper empirically examines the effect of domestic liberalization of services on exporting firms' quality upgrading. We examine a number of other trade policies, including: tariffs in export destination countries; and input- and output-tariffs in China. Following China's accession to the World Trade Organization in December 2001, these trade policies changed substantially during our sample period of 2000 - 2006. Our findings suggest that, of all the policies, reduced input tariffs contributed the most to raising export product quality. Easing of services' restrictiveness also resulted in improved export product quality, but mainly for foreign owned enterprises.

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JEL Classification: F15; F53

Services Liberalization and Export Quality: Evidence from China

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1. Introduction

Improving product quality is an important source of economic development. Apart from enhancing production technologies and developing new products, product quality upgrades are also a significant form of innovation. For instance, Grossman and Helpman (1991) constructed a quality-ladder model, where firms' investment in improving product quality became an engine of economic growth. Similarly, Hummels and Klenow (2005) have shown that about nine per cent of the difference in real income per worker across countries can be attributed to differences in export quality. Therefore, to boost economic growth, it is crucial to encourage firms to upgrade the quality of their products.

This paper is the first study to examine the effects of domestic liberalization of services on the quality of exporting firms' products. Some policy measures can stimulate this, either using direct measures, such as tax incentives for research and development (R&D), or indirect measures, like various trade policies. Among all these, we focus on the effectiveness of domestic liberalization of services. Given that the services sector plays an important role in industrialization (Eswaran and Kotwal 2002), liberalization of services, in particular, could be an effective tool to improve economic efficiency and domestic firms' productivity. Using a computable general equilibrium model, Konan and Maskus (2006) showed that a reduction of trade-related services barriers generates relatively large welfare gains compared to a reduction of overall trade barriers. Jouini and Rebei (2014) explored the growth effect of liberalization of services, and found that it is the goods sector that enjoys the most benefits. Since liberalization of services can attract more foreign providers of high-quality services, this too may induce exporters to upgrade the quality of their exports.

To show the relative effectiveness of a services-related policy, we also examine the impact of various kinds of trade policies, including: tariffs in destination countries; and both input- and output-tariffs in the exporting country. Tariff reductions in destination countries might increase not only potential profits earned in that country, but also the exporting firms' gains from their investments in quality upgrades. "Input tariff" refers to tariffs on products and intermediate goods used for production of a given export product. Its reduction enables firms to import higher quality inputs and improves the quality of export products. An "output tariff" taxes imports of a product that firms export, or similar/competitive products. Lower output tariffs intensify domestic market competition and create positive incentives for domestic firms – including the ones involved in

export – to engage in innovation and product upgrades. The main purpose of this study is to compare the impact of services' liberalization with that of various tariff changes.

A study of this nature can also help uncover the rationale behind the trade policies of developing countries. For example, while a reduction of input and output tariffs lowers trade barriers, it may be difficult for developing countries to reduce all tariffs as they are an important source of government revenue.[1] In this context, liberalization of services might be the more feasible option, because restricting services usually does not directly generate government revenues. Also, if reduction of tariff rates in trade partner countries plays a key role in upgrading the quality of exported products, devoting policy resources to negotiate regional trade agreements (RTAs) can be an effective strategy. In short, our study can help better understand ways of developing effective policies to improve firms' product quality.

In this paper, we focus exclusively on China's exports, for three important reasons. First, after China joined the World Trade Organization (WTO) in December 2001, its aforementioned trade policy measures changed substantially during our 2000 - 2006 sample period. Several papers have examined the effects of these changes on price, quality, scale, breadth, and organization of Chinese exports (Bas and Strauss-Kahn 2015; Fan *et al*. 2015, 2018; Feng *et al*. 2016, 2017; and Brandt and Morrow 2017). Second, although China is a large country with a sizeable population, it is still a developing nation with per capita GDP of US$ 2,099 in 2006 (World Development Indicator). With an abundance of low-wage workers and a relative advantage in international production fragmentation, China became the so-called "World's Factory" for labour-intensive products as well as a variety of information and communications technology (ICT) goods. Nevertheless, enhancing product quality and technology is crucial for China's further development. Third, using a firm-export destination-harmonized system (HS) with eight-digit code-year level export data, we can access very detailed export information for China.

Specifically, we examine export quality at a firm-export destination-harmonized system (HS) six-digit level for China during 2000, 2003 and 2006. Although a number of empirical studies investigating export quality have been conducted previously (Khandelwal 2010; Amiti and Khandelwal 2013; Bas and Strauss-Khan 2015; Fan *et al*. 2015), finding adequate measures of export product quality remains a challenge. The method proposed by Khandelwal *et al*. (2013), which computes product quality using trade prices as a proxy for consumer prices, is a widely used measure. Our study modifies this method by taking into account different tariff rates in export

[1] For example, according to the World Development Indicator database of the World Bank, the share of "customs and other import duties" in 2010 was 89 per cent of total tax revenue in Bahrain, 70 per cent in the Maldives, and 52 per cent in Ethiopia. Many other countries, such as Nepal, Cambodia, the Philippines, Botswana, Bangladesh, Namibia, the Democratic Republic of the Congo, and Afghanistan, have rates higher than 20 per cent.

destination countries. Since the difference explains the gap between trade prices and consumer prices, our estimates should be an improvement over those from past studies.

Ownership, one of the key features that differentiates Chinese firms' export behaviour, can change the effect that trade policy has on export quality. We distinguish between state-owned enterprises (SOEs), private companies, and foreign-owned enterprises (FOEs). Whalley and Zhang (2011) have highlighted the need to carefully consider the behavioural response of SOEs to trade liberalization in China. Conceptually, SOEs might be less sensitive to trade policy changes, compared to private companies or FOEs, mainly because they can recapitalize their losses in the banking system. Thus, they seek to maximize the size of their enterprises, rather than their profits. Also, liberalization of foreign direct investment (FDI) in services may affect the behaviour displayed by FOEs because they prefer services providers of the same nationality. This analysis will uncover the rationale behind export quality upgrades for each type of trade liberalization.

Our study links two parts of the literature about the WTO's effect on Chinese trade. One examines liberalization of services on manufacturing firms' performance. For example, Arnold *et al*. (2011, 2016), Fernandes and Paunov (2012), Bas and Causa (2013), and Duggan *et al*. (2013) examined its effects on manufacturing firms' productivity. These studies found that liberalization of services had a positive role.[2] Compared to these studies, our paper focuses on the role of services liberalization in upgrading firms' export product quality. We chose export product quality as an outcome measure because it enables us to quantify the effect of liberalization of services relative to input and output tariffs in China as well as in the export destination countries.

The second part of the literature that we address is the impact of various kinds of tariffs on export quality. By using gross prices as a proxy for quality, Ludema and Yu (2016) and Görg *et al.* (2017) investigated the effects of tariffs in export destination countries, while Fan *et al.* (2015) examined the effects of output tariffs in origin countries. Bas and Strauss-Kahn (2015) and Fan *et al.* (2015), using a quality measure similar to ours, explored the impact of input tariffs in origin countries.[3] In our analysis, we included all of these tariff changes and also examined how their effects on export quality changed for firms with different ownerships.

The paper is organized as follows. The next section summarizes theoretical considerations about how tariff reductions and liberalization of services affect firms' export product quality. Section 3 explains our empirical framework and provides data overview. Section 4 reports the estimation results, and Section 5 concludes.

[2] Also, Bas (2014) found a positive effect from the liberalization of services on firms' exporting decisions.

[3] Some studies look at how tariffs impact firms' performance. Bustos (2011) explored the effect of tariffs in export destination countries on firms' innovation, and Amiti and Konings (2007) examined the effects of input and output tariffs on firms' productivity. These studies consistently found that liberalization produced positive effects.

2. Theoretical Background

This section explains the theoretical background of how tariff reductions and liberalization of services affect firms' export product quality.[4]

2.1. Liberalization of Services

Reliable and reasonable provision of business services are important elements for efficient production and sales activities. This includes services required for production, such as telecommunications, product design, product planning, and R&D. Manufacturers also need to perform "post-production services", such as outbound logistics, marketing and sales, and repair and maintenance. If entry into services sectors is restricted, the cost of performing these services becomes high, which will handicap manufacturing firms. Liberalization of services helps reduce transportation, production, and marketing costs by attracting high-quality service providers and improving service efficiency through competition, demonstration, and knowledge spillover effects brought about by FDI (Blomström and Kokko 1998).

Several studies theoretically and empirically show improvements in manufacturing firms' performance by liberalizing services. Nordas (2010) theoretically demonstrated that liberalization of services enhances manufacturing firms' competiveness through a manufacturing-services linkage, as indicated in the input-output table. By employing firm-level data from the Czech Republic, Arnold *et al.* (2011) empirically showed that liberalization of services improved manufacturing firms' productivity. Bas (2014) incorporated an upstream services sector into the framework of Melitz (2013) and then showed, both theoretically and empirically, that liberalization of services reduced both fixed and variable export costs.

Reduction of production and sales costs by liberalizing services increases an exporting firms' incentive to upgrade product quality. In a theoretical model of a heterogeneous firm with endogenous quality upgrading, Antoniades (2015) showed that lower production cost is associated with higher product quality. In his model, optimal product quality increases with a firm's productivity and the scope for quality differentiation, suggesting that upgrading quality increases a firm's profits. As a result, the quality is increasing market size and consumers' taste parameter for quality, and decreasing the cost of quality adoption in the production process.

Based on the research conducted by Antoniades (2015), at least two kinds of "cost-base" paths allow liberalization of services to affect firms' quality upgrading. One is that, given the scope

[4] Theoretical studies have developed international trade models about product quality, such as those by Flam and Helpman (1987), Grossman and Helpman (1991), and Hummels and Klenow (2005). More recent studies have extended the model of heterogeneous firms in international trade developed by Melitz (2003) to incorporate quality differentiation. These include studies by Baldwin and Harrigan (2011), Fajgelbaum *et al.* (2011), Manova and Zhang (2012), and Feenstra and Romalis (2014).

for quality differentiation, lower production cost through liberalization of services increases a product's profits, thereby raising the marginal gains from upgrading quality. The other is that liberalization of services can increase the scope for quality differentiation. Better access to high-quality services facilitates the exchange of ideas, know-how, and technology in upgrading product quality, reducing the cost of quality adoption, and increases the scope for quality differentiation. In sum, liberalization of services will reduce the production cost and the quality-adoption cost of manufacturing firms, ultimately increasing their incentives to improve product quality.

In addition to the above cost-oriented path, there is also a "demand-base" path. Liberalization of services increases consumers' taste for quality, which increases the scope for quality differentiation (Antoniades 2015). For instance, liberalization of services facilitates manufacturers' provision of better "aftermarket" services, such as offering technical support and providing repair and maintenance services. Provision of these services raises the attractiveness of products and consumers' willingness to pay for them. Therefore, liberalization of services may improve manufacturing competitiveness in international trade through better services, enabling companies to make higher mark-ups in export markets. These, in turn, could create room for firms' investment in product quality.

Liberalization of services may be more effective for manufacturing FOEs. Manufacturing firms may take on necessary service activities (e.g., post-production services) by themselves or employ independent service organizations. In the former case, Ishikawa *et al.* (2010) theoretically showed that liberalization of services enables manufacturing FOEs to switch from outsourcing to domestic service providers, to performing in-house, which reduces service costs. In the latter case, manufacturing FOEs may hire foreign-owned services providers of the same nationality. Thus, manufacturing FOEs enjoy more services provided by foreign-owned providers than domestic manufacturing firms do, and thus greatly reduce service costs. These reductions induce manufacturing FOEs to upgrade their product quality, and this liberalization of services might be larger for FOEs.

2.2. Tariff Reductions in Destination Countries

Tariff reductions in export destination countries can increase an individual firm's incentives to upgrade its product quality. Verhoogen (2008) built a heterogeneous firm model, in which a larger number of high-skilled workers - relative to low-skilled workers - leads to more high-quality products. In his model, increased access to destination markets stimulates exporting firms to employ more skilled workers and thereby upgrade the quality of their respective products. These theoretical predictions were supported by empirical evidence from the Mexican manufacturing

sector. Bustos (2011) also developed a heterogeneous firm model, where firms with different labour productivity choose between low- and high-technology. The high-technology firms generate larger profits but incur higher fixed costs. Bustos also showed that trade liberalization promotes the adoption of high technology, both theoretically and empirically, leading to higher-quality goods.

Some studies examine firms' choice of product quality more explicitly. Hallak and Sivadasan (2013) incorporated firms' ability to develop high-quality products - referred to as "product productivity" - into a standard firm-heterogeneity model. They assumed that trade costs decrease with quality and explored firms' different quality choices. In equilibrium, quality is higher for exporters than for non-exporters, and empirical tests strongly support the model's prediction. By using a heterogeneous firm model with endogenous quality upgrading and variable price-cost mark-ups, Ludema and Yu (2016) claimed that tariff reductions in destination countries increase profit opportunities in these countries and hence provide incentives to upgrade product quality. Using manufacturing plants and U.S. transaction-level export data, they find evidence to support their theoretical predictions. Based on this literature review, we expect that tariff reductions in destination countries will improve the quality of exported products.

2.3. Input Tariff Reductions

More variety and high quality of inputs might be indispensable to produce high-quality products. On the one hand, an import tariff reduction in the exporting country will expand the variety of inputs and lower exporters' marginal production costs. Given the level of quality, profits in the destination country improve. Based on a heterogeneous-firm model of international trade, Fan *et al*. (2015) included input tariffs and empirically confirmed that an input tariff reduction induces exporters to raise the quality of their products. On the other hand, an input tariff reduction may improve the quality of inputs if high-quality imported inputs help produce high-quality products. For instance, Kugler and Verhoogen (2012), who considered an endogenous choice of both input and output quality, theoretically demonstrated that plants with higher productivity use high-quality inputs and produce high-quality products. Thus, better input quality, achieved through input tariff reductions, increases output prices by upgrading output quality.

2.4. Output Tariff Reductions

Output tariffs affect export product quality in at least two ways. One is based on learning from imported products. Output tariff reductions increase the variety of imported products. If newly imported products are high quality, exporters improve their products' quality by learning about

such products. Some studies provide empirical evidence that imports can be a source of knowledge (Romer 1993; and Coe and Helpman 1995). Connolly (2003), who constructed a quality ladder model of endogenous growth in which domestic firms obtain information about foreign products by importing them, showed both theoretically and empirically, that imports of high-tech products promote innovation and imitation in developing countries.

The other path is based on competition with imported products. A reduction in an exporting country's output tariff intensifies product competition in the domestic market and changes domestic and exporting firms' incentives to innovate and upgrade product quality. Amiti and Khandelwal's (2013) theoretical model empirically showed that more competition either increases or decreases producers' incentives to upgrade quality, by means of two contrasting effects. On the one hand, increased competition diminishes ex-post profits from higher quality, thereby lowering the incentive (the *appropriability effect*). On the other, it could reduce firms' pre-upgrade profits, inducing them to improve product quality (the *escape competition effect*). The manner in which a reduction in output tariffs affect firms' incentives to upgrade product quality depends on the rents received from this higher quality (i.e., the ex-post profits minus the pre-upgrade profits).

Furthermore, the competition effect may be heterogeneous across firms. In particular, it may depend on a firm's productivity (Antoniades 2015). More product competition decreases the market share for high-cost, low-productivity firms and reduces their incentives to produce high-quality products. Conversely, it expands the market share of low-cost, high-productivity firms and raises their incentives to upgrade the quality of products. This indicates that trade liberalization in output markets leads to quality upgrades for high-productivity firms.

3. Empirical Framework

This section first explains our empirical framework to examine how various trade policies affect export product quality. Then, data sources, empirical issues, and trade policy variables are discussed.

3.1. Empirical Specifications

We start with a traditional measure of export quality: export unit price (exports divided by export quantity). A simplified, reduced, form of this equation is as follows:

$$\ln P_{fcpt} = \beta_1 \ln\left(1 + Tariff_{cpt}\right) + \beta_2 \ln\left(1 + Input\ tariff_{pt}\right) + \beta_3 \ln\left(1 + Output\ tariff_{pt}\right) + \beta_4 Services\ Restrictiveness_{pt} + \mathrm{u}_{fcp} + \mathrm{u}_{ft} + \mathrm{u}_{ct} + \epsilon_{fcpt}$$

where P_{fcpt} is firm *f*'s export unit price of product *p* from China to country *c* in year *t*. $Tariff_{cpt}$ is most-favoured nation (MFN) tariff rates of product *p* in country *c* in year *t*. $Input\ tariff_{pt}$ is

China's average MFN rate among products inputted for production of product p in year t. $Output\ tariff_{pt}$ is China's MFN rate of product p in year t. $Services\ Restrictiveness_{pt}$ is China's average FDI restrictiveness index among services sectors, inputted for production of product p in year t (the higher the index, the more restrictive the sector). "u" refers to fixed effect (FE). Firm-year FE controls for firm-wide characteristics,[5] while destination-year FE controls for a destination's demand size, in addition to exchange rates. ϵ_{fcpt} is a disturbance term. We estimate this equation by the ordinary least square (OLS) method.

Next, because export unit price includes not only a quality component but also various factors such as mark-up, we replace export unit price with a more sophisticated measure of export quality by extending the method proposed in Khandelwal *et al.* (2013). To construct the new measure of export quality, we first estimate the following (demand) equation by the OLS:

$$\ln X_{fcpt} + \sigma_{cp} \ln\left(\left(1 + Tariff_{cpt}\right) \times P_{fcpt}\right) = \mathrm{u}_p + \mathrm{u}_{ct} + \epsilon_{fcpt}$$

where $\ln X_{fcpt}$ is a log of export quantity, and σ_{cp} is a demand elasticity.[6] As mentioned in the introductory section, unlike the original version in Khandelwal *et al.* (2013), we introduce tariff rates on the left-hand side of the equation to take into account the difference in tariff rates across countries, products, and years.[7] We estimate this equation by sections in HS tariff classification. Then, we recover export quality Q by computing the following:

$$\ln \hat{Q}_{fcpt} = \widehat{\epsilon_{fcpt}} / \left(\sigma_{cp} - 1\right)$$

In the later estimation, we use this quality measure as a dependent variable.

The aforementioned discussions suggest that the coefficients for $Input\ tariff_{pt}$ and $Services\ Restrictiveness_{pt}$ should be negative, because the expansion of input varieties and the rise of input quality through the reduction of input tariffs can enhance export product quality. Such quality enhancement is also expected for the liberalization of services, since it can lower the costs of production and quality adoption and raise consumer's willingness to pay. As the reduction of tariffs in a destination increases profit opportunities, $Tariff_{cpt}$ is expected to be associated with a negative coefficient. The coefficient for $Output\ tariff_{pt}$ is relatively unclear, depending on the relative strengths of appropriateness and escape competition. However, another effect, the effect of learning from superior import products, may yield a negative coefficient.

[5] Fernandes and Paunov (2012) and Bas and Strauss-Kahn (2015) introduce the interaction of a trend term with firms' initial size to examine the possibility that the trade policy variable could be picking up differential performance trends across firms with different input intensity. Our inclusion of firm-year FE directly controls for such trends. Also, this type of FE controls for time-variant location characteristics, including firm/exporter agglomeration.

[6] The data on elasticities at a country-HS, three-digit, level are obtained from Broda *et al.* (2017).

[7] The introduction of tariff rates significantly changes the estimates of export quality. Statistics for the absolute difference of logged export quality measures with and without this variable has a mean of 0.12, a standard deviation of 0.35, and a maximum of 41.27

Since previous studies already showed the exogeneity of these trade policy changes through accession to the WTO against industry characteristics (Brandt *et al.,* 2017; Bas and Strauss-Kahn, 2015), we mention this issue only briefly. For example, Bas and Strauss-Kahn (2015), who examined the correlation of various industry characteristics (e.g., value added, intermediate inputs, investment, the Herfindahl index, exports, and imports) in 2000 with changes of input tariffs from 2000 to 2006, found insignificant correlations. Since we use the same data, we do not repeat this work. Nevertheless, we later discuss and address one endogeneity issue related to input tariffs and services' restrictiveness.

3.2. Data Issues

Trade data in the firm-product-destinations countries level in various years used in this study were obtained from the Department of Customs Trade Statistics at the Chinese General Administration of Customs. This data provides detailed export information about company name, year, month, eight-digit HS product code, product unit, export quantity, value, type of company ownership, export destination, and type of trade.[8] Specifically, we use data for 2000, 2003, and 2006.[9] Because the HS classification version changes from HS 1996 to HS 2002 during the sample period and we cannot convert the HS eight-digit level between two versions, we aggregate export values and export quantity by HS six-digit levels and then compute the export unit price. HS codes in HS 2002 are converted to HS 1996 using an HS six-digit level converter, available on the the World Integrated Trade Solution (WITS) website.[10] Export prices are deflated at an HS two-digit level using the deflators in Upward *et al.* (2010). In our estimation sample, 53 countries are included as export destinations.[11]

Since some data issues remain, we conduct additional data cleaning, as follows. First, products with HS codes higher than 980,000 are dropped from the sample because of the mix of miscellaneous products. Second, we focus on ordinary trade to exclude observations where firms can enjoy preferential tariffs, although the original dataset includes other types of trade, such as processing trade. (See, for example, Brandt and Morrow 2017). Third, we drop firms whose

[8] This dataset does not allow us to directly identify if a transaction is inter-firm or intra-firm. Nevertheless, the latter is found in some FOE transactions. We adjust our model later by type of firm ownership.

[9] Originally, we have data for 2000-2006, but liberalization of services indices are available only for 1997, 2003, and 2006 before 2007.

[10] https://wits.worldbank.org/WITS/WITS/Restricted/Login.aspx

[11] We restrict export destination countries only to those in which MFN rates are available for all of 2000, 2003, and 2006. Also, the availability of estimated elasticity limits our sample countries, which include: ARG, AUS, BOL, BRA, CAN, CHL, COL, DEU, DNK, ECU, EGY, ESP, FIN, FRA, GBR, GRC, GTM, HND, IDN, IND, IRL, ISL, ITA, JOR, JPN, KOR, LKA, MAR, MDG, MEX, MUS, MWI, MYS, NIC, NLD, NOR, NZL, OMN, PER, POL, PRT, ROM, SAU, SLV, SVN, SWE, TGO, THA, TUN, TUR, URY, USA, and VEN.

ownership type changed during our sample periods. Fourth, we also drop firm-product-destination observations with changes in quantity unit during our sample periods. Lastly, following Bas and Strauss-Kahn (2015), we drop intermediary or trading companies. Specifically, we exclude "firms that include in their name Chinese characters with English-equivalent meaning of importer, exporter, and trading are considered intermediary."[12]

WITS is the data source for all tariff variables. Using the aforementioned converter at an HS six-digit level between HS1996 and HS2002, we compute MFN tariff rates in all countries, including China, which are used as $Tariff_{cpt}$ and $Output\ tariff_{pt}$. Tariff-line level MFN rates are aggregated at an HS six-digit level by using the simple average. Using MFN rates in China, we also compute input tariffs. Following the literature (e.g., Bas; and Strauss-Kahn 2015), we use a weighted average of MFN tariff rates among products inputted for the production of a given product. The share of input values is used as a weight, and this weight is computed using a 2002 Chinese Input-Output (IO) table, from the National Bureau of Statistics of China for 122 industries, and the concordance between eight-digit codes in HS2002 and the IO industry code. In this computation, we restrict HS to six-digit-level products that can be matched one-on-one between HS2002 and HS1996.

Information about service restrictiveness is drawn from the "OECD FDI Regulatory Restrictiveness Index" (FDI Restrictiveness Index) developed by the Organisation for Economic Co-operation and Development (OECD).[13] This index gauges the restrictiveness of a country's FDI rules by looking at the four main types of FDI restrictiveness: foreign equity limitations; screening or approval mechanisms; restrictiveness on the employment of foreigners as key personnel; and operational restrictiveness (e.g., restrictiveness on branches, capital repatriation, and land ownership). Restrictiveness is evaluated on a 0 (open) to 1 (closed) scale.[14] Based on the significance of manufacturing inputs and the feasibility of matching these with IO industry codes, we focus on the following services sectors: wholesale trade; retail trade; transportation; telecommunications; banking; insurance; and business services. Then, using a method similar to the above for input tariffs, we compute the weighted average of FDI restrictiveness indices among these services sectors. Since the indices are available only for three years (1997, 2003 and 2006), we use the 1997 index for 2000. The basic statistics are provided in Table 1.

[12] Specifically, the original data included 30 million transactions. The exclusion of trading companies results in 13 million fewer transactions. Ordinary trade reduces the total by another 1.5 million. The drop of observations with ownership or quantity unit eliminates another 10,000 transactions. Lastly, 1,000 observations also are dropped by excluding HS codes greater than 980,000.

[13] http://www.oecd.org/investment/fdiindex.htm

[14] See Koyama and Golub (2006) for a comprehensive description of this index.

Table 1. Basic Statistics

	Obs	Mean	Std. Dev.	Min	Max
Price	463,512	1.215	1.824	-8.962	15.771
Quality	463,512	-0.037	11.904	-832.518	137.198
Tariff in Destination	463,512	0.066	0.066	0	2.269
[Type = SOE]	463,512	0.024	0.052	0	2.269
[Type = Private]	463,512	0.010	0.035	0	2.007
[Type = FOE]	463,512	0.032	0.056	0	2.269
Input tariff in China	463,512	0.091	0.032	0.023	0.226
[Type = SOE]	463,512	0.032	0.049	0	0.226
[Type = Private]	463,512	0.012	0.030	0	0.195
[Type = FOE]	463,512	0.047	0.051	0	0.226
Output tariff in China	463,512	0.124	0.064	0	0.793
[Type = SOE]	463,512	0.043	0.071	0	0.647
[Type = Private]	463,512	0.017	0.048	0	0.470
[Type = FOE]	463,512	0.063	0.077	0	0.793
Services restrictiveness	463,512	0.595	0.130	0.345	0.789
[Type = SOE]	463,512	0.206	0.297	0	0.789
[Type = Private]	463,512	0.086	0.210	0	0.789
[Type = FOE]	463,512	0.303	0.311	0	0.789

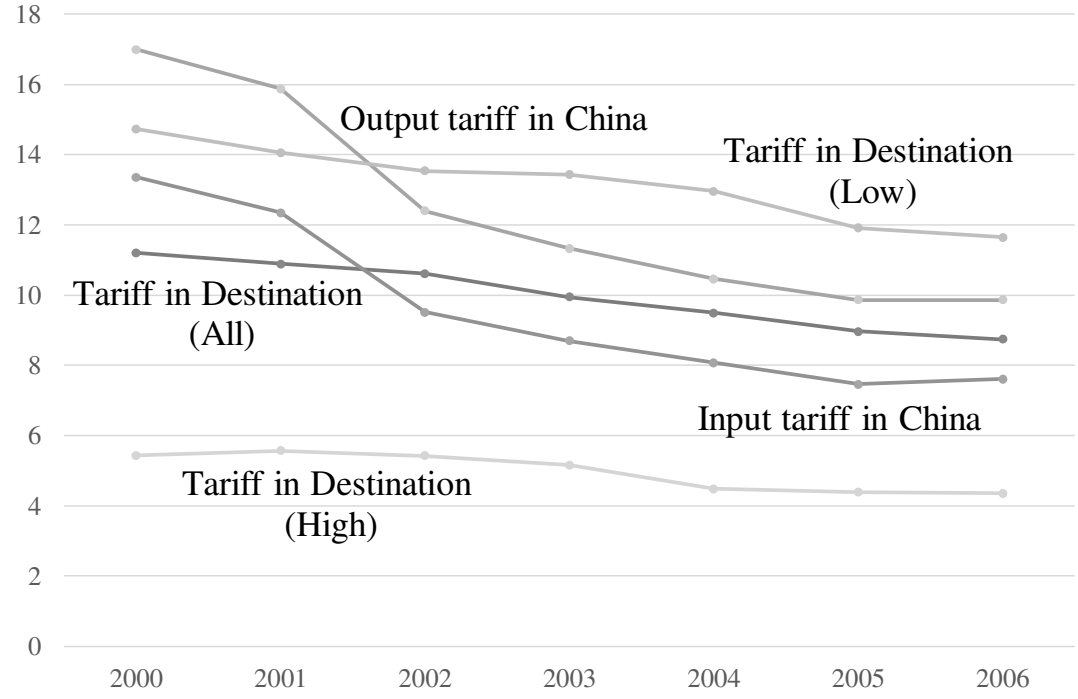
Source: Authors' computation

3.3. Data Overview

Before reporting our estimation results, we give a brief overview of the trade policy variables used in this study. Figure 1 depicts changes over time in the simple average for three kinds of tariffs. We do not repeat the detailed discussion of China's tariff changes during its WTO accession year because it is provided in previous studies (e.g., Bas and Strauss-Kahn 2015; Brandt *et al*. 2017; Branstetter and Lardy 2006). Nevertheless, this figure is crucial for comparing China's tariff rates with the world average of MFN rates. As shown in previous studies, both output and input tariffs in China have decreased, particularly from 2001 to 2002. Also, input tariffs have been lower than output tariffs. Average global tariff rates also decreased modestly. Output tariffs in China remained higher than the world average (Tariffs in All Destination Countries), but since 2002 were below the average of low-income countries (Low Tariffs in Destination Countries).[15]

[15] Country classifications, based on income, are provided later.

Figure 1. Changes of Tariffs (Percentage)



Source: WITS

Note: Tariff in Destination (All), Tariff in Destination (Low), and Tariff in Destination (High) show MFN tariff rates in all countries, low income countries, and high income countries, respectively.

We now consider liberalization of services. In China, FDI in the services sector is governed by the "Catalogue for the Guidance of Foreign Investment Industries," which classifies investment sectors into four categories: encouraged; restricted; prohibited; and permitted. Based on the "General Agreement on Trade in Services" (GATS) of the WTO, from 2002 to 2007, China's commitment to implement deep and wide-ranging trade liberalization in the services sector has opened most of these markets to foreign service providers. This includes the fields of accounting, architecture, construction, distribution, environmental services, financial services, law, motion pictures, professional business and computer services, telecommunications, and travel and tourism {specifically, 10 of the 12 major GATS service categories and 93 of the 160 minor categories (Chen and Whalley 2014)}. According to the frequency ratio of openness indices developed by Hoekman (1995), China has made substantial commitments to open trade after joining the WTO as a developing country in both perspectives of breadth and depth (Mattoo 2003).[16]

However, both the feasibility and the likelihood of implementing these extensive policy

[16] Hoekman (1995) calculates three sectoral coverage indicators: unweighted count coverage, weighted average coverage, and the share of "no restriction" commitments relative to the maximum number of possible sectors. For international comparisons of openness in the services trade between China and other countries, refer to Table 3 in Mattoo (2003)

changes are doubtful in the short term. Although China planned to progressively expand allowable foreign ownership and geographical coverage of licenses after entering the WTO, liberalization of services has slowed. Whalley (2006) discussed the implementation of China's WTO accession commitments in core intermediation services through time (e.g., banking or insurance) and space (e.g., telecommunications). He indicated the existence of explicit barriers to services provision through entry barriers to local market (right to establish in specific cities), rules on conduct (regulation on business content), and competition rules in a market (the number and size of competitors). As a result, he concluded that foreign entry into key services sectors remains limited in the Chinese market.[17]

Liberalization of services in China can be quantitatively clarified using the aforementioned FDI restrictiveness index. Table 2 illustrates the index for China in 1997, 2003, and 2006, for services sectors empirically examined in the next section. The score in all sectors including manufacturing sectors gradually decreased from 0.627 in 1997 to 0.449 in 2006, while scores for most services sectors are larger than that in total. This suggests that China welcomes FDI more in manufacturing than in the services sector. While scores vary substantially across sectors and years, overall they reveal that in 2006, China continued to have significant restrictiveness and regulations. However, the scores also decreased over time, particularly in 2006, providing evidence that China attempted to liberalize services. Nevertheless, China's progress needs to accelerate. For example, examining this FDI services index for 77 countries in 2004-05, Golub (2009) showed a figure ranging from 0.04 to 0.67. Among the sample countries, China's score was 0.42, the ninth-highest.

More detailed observations, by sector, are as follows. The construction sector exhibited its lowest score in the years before and just after the WTO accession, suggesting fewer restrictiveness in this sector than others. As such, construction was listed as an "encouraged" FDI sector. The distribution sector's score decreased significantly from 2003 to 2006. In particular, the score in the wholesale sector reached its nadir in 2006. To fulfil its WTO commitment to open domestic distribution markets within three years, China largely eliminated restrictiveness on foreign ownership, regions, and the number and size of competitors for wholesale and retail industries in 2004. A gradual decrease of the score in business services can be attributed to implementation of the 2006 Closer Economic Partnership Arrangement (CEPA) with Hong Kong and Macau, which granted new and improved access in these sectors over GATS commitments (Chen and Whalley 2014). The score in the transportation services sector remained relatively high because more air and maritime transportation, brought about by China's economic growth, was taken over by large

[17] For example, the percentage of workers employed by foreign insurance companies accounted for 1.46 per cent of the total Chinese insurance industry in 2000, increasing to 2.82 per cent in 2004 and to 3.80 per cent in 2006. In addition, total assets of foreign banks only approximately 3 per cent in 2006.

SOEs and was not open to foreign providers.

Table 2. FDI Restrictiveness Index for Services in China

	1997	2003	2006
Construction	0.400	0.350	0.290
Distribution	0.763	0.763	0.320
Retail	0.775	0.775	0.390
Wholesale	0.750	0.750	0.250
Transport	0.778	0.737	0.622
Surface	0.775	0.650	0.400
Maritime	0.785	0.785	0.785
Air	0.775	0.775	0.680
Communications	1.000	0.875	0.750
Fixed telecoms	1.000	1.000	0.750
Mobile telecoms	1.000	0.750	0.750
Financial services	0.792	0.683	0.542
Insurance	1.000	0.875	0.650
Banking	0.625	0.500	0.500
Business services	0.575	0.450	0.375
All (including manufacturing)	0.627	0.562	0.449

Source: OECD FDI Regulatory Restrictiveness Index

The FDI restrictiveness index shows that liberalization in the core services sectors of banking, insurance, and communications, however, has not progressed. Both the fixed and mobile telecommunications sectors have been dominated by a few large SOEs. Although China's Ministry of Information Industry (MII) has set new rules for basic and value-added services for foreign telecommunications providers, this sensitive sector, with a high 0.75 score in 2006, continues to be highly regulated in China. Due to national security and economic nationalism, this sector only allows foreign companies to provide value-added services, such as e-mail, online transactions, and some internet content. Financial services sectors are less restricted but still highly regulated. With a score of 1.000, the insurance sector was totally closed in 1997. However, with the removal of some restrictions, the score decreased gradually to 0.650 in 2006. Similarly, the banking sector's score went down considerably, from 0.625 in 1997 to 0.500 in 2003 and 2006. The 2003 decrease can be attributed to the CEPA with Hong Kong and Macau, which granted the preferential right to invest and engage in Chinese financial markets to banks, insurance companies, and security companies operating in Hong Kong.

4. Estimation Results

This section shows our estimation results. We first report our baseline results, using export price as a quality measure. Then we provide results using the quality measurement developed by Khandelwal *et al.* (2013). Lastly, after conducting some robustness checks on our results, we examine how the results change according to firms' ownership.

4.1. Baseline Results

Table 3 reports our baseline results, in which export unit price is the dependent variable. In columns (I)-(IV), we separately introduce our trade policy variables, while column (V) includes all of the variables. Since most of our focused variables are product-year variables, we cluster standard errors by HS eight-digit codes. The table illustrates that, in China, output tariffs alone meaningfully influence export prices. The coefficients for output tariffs are significantly negative, indicating that the export price of a product rises when Chinese tariffs for that product are reduced. However, reduction of tariff rates in export destination countries and input tariff rates in China, while lowering services restrictions, do not significantly influence export prices.

Next, we estimate our model for differentiated and non-differentiated (or homogenous) export products separately. As shown in Bas and Strauss-Kahn (2015), the effect of trade policy on export product quality is more relevant to differentiated products. We classify products based on the liberal classification of differentiated products developed in Rauch (1999). The results are shown, respectively, in the "Homogenous" and "Differentiated" columns in Table 4. All the variables for homogeneous products have insignificant coefficients. Results for differentiated products are similar to those reported in Table 3; namely, only the coefficient for output tariffs is significantly negative. Its magnitude is also almost same as that in Table 3, which implies that a 10 per cent reduction of output tariffs raises export price by 7.5 per cent (=10*(exp(0.5609)−1)).

Lastly, we separate import countries into low- and high-income countries and then estimate our model for both groups separately. Similar to the above case, the effects of trade policy on export product quality might be more influential when exporting to high-income countries. As displayed in the "Low" and "High" columns in Table 4, all variables have insignificant coefficients when exporting to low-income countries. On the other hand, results for high-income import countries are similar to those reported in Table 3. In the case of differentiated products, only output tariffs have a significantly negative coefficient, whose absolute magnitude rises slightly. A 10 per cent reduction of output tariffs raises export prices by 9.1 per cent.

Table 3. Baseline Results for Export Prices

	(I)	(II)	(III)	(IV)	(V)
Tariff in Destination	-0.1277				-0.1131
	[0.0932]				[0.0921]
Input tariff in China		-0.4845			-0.0126
		[0.4889]			[0.5077]
Output tariff in China			-0.5494***		-0.5397***
			[0.1615]		[0.1720]
Services restrictiveness				-0.1834	-0.094
				[0.3286]	[0.3258]
Number of observations	463,512	463,512	463,512	463,512	463,512
Adjusted R-squared	0.897	0.897	0.897	0.897	0.897

Notes: A dependent variable is a log of export unit price. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. Parentheses are standard errors clustered by HS eight-digit code. In all specifications, we include firm-country-product, firm-year, and country-year fixed effects.

Table 4. Estimation Results by Group

	Homogenous	Differentiated	Low	High
Tariff in Destination	-0.0164	-0.1795	-0.1141	-0.196
	[0.1837]	[0.1125]	[0.1252]	[0.1752]
Input tariff in China	0.2832	-0.1562	-0.2455	0.0305
	[1.0654]	[0.5880]	[1.1299]	[0.5106]
Output tariff in China	-0.3482	-0.5609***	0.1379	-0.6447***
	[0.3010]	[0.1992]	[0.2618]	[0.1821]
Services restrictiveness	-0.1181	-0.0884	-0.897	0.0414
	[0.3781]	[0.3852]	[0.7078]	[0.3221]
Number of observations	76,063	378,899	79,110	373,430
Adjusted R-squared	0.879	0.8995	0.9265	0.88

Notes: A dependent variable is a log of export unit price. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. Parentheses are standard errors clustered by HS eight-digit code. In all specifications, we include firm-country-product, firm-year, and country-year fixed effects. In the "Homogenous" and "Differentiated," columns, we restrict sample products to non-differentiated and differentiated products, respectively. "Low" and "High" indicate our country restriction to only low-and high-income countries, respectively.

4.2. Export Quality

In this subsection, we report and discuss the estimation results by using a revised Khandelwal *et al.* (2013) quality measure as the dependent variable. The results of the complete sample are shown in the "All" column of Table 5. Unlike the case of export unit prices, Table 5 demonstrates that except for tariffs in the export destination country, all trade policy variables are associated with a significantly negative coefficient, namely, lower input and output tariff rates in China, in addition to fewer FDI service restrictions, contribute to raising export product quality. In particular, the

absolute magnitude of the coefficient is much larger for input tariffs than that for output tariffs. On the other hand, tariff rates in export destination countries do not have a significant effect on product quality. As a result, a one standard deviation reduction of input tariffs, output tariffs, and services restrictiveness raises export quality by 49 per cent, 11 per cent, and 20 per cent, respectively.

Table 5. Estimation Results for Export Quality

	All	Homogenous	Differentiated	Low	High
Tariff in Destination	-0.7977	0.2196	-1.0575	-0.5801	0.3545
	[0.6781]	[0.6197]	[0.9627]	[0.7453]	[0.7930]
Input tariff in China	-15.4119***	-5.2777	-17.3245***	-19.1582**	-14.8625***
	[2.0754]	[4.5323]	[2.2258]	[7.9530]	[1.9348]
Output tariff in China	-1.6787**	-0.2209	-2.5033***	-0.4871	-2.0148***
	[0.6741]	[1.6474]	[0.6728]	[1.8321]	[0.7290]
Services restrictiveness	-1.5176*	-0.728	-1.627	-1.9737	-1.4294
	[0.8920]	[1.9622]	[1.0019]	[2.6064]	[0.8985]
Number of observations	463,512	76,063	378,899	79,110	373,430
Adjusted R-squared	0.9264	0.95	0.9193	0.9042	0.9295

Notes: A dependent variable is a log of export quality. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. Parentheses are standard errors clustered by HS eight-digit code. In all specifications, we include firm-country-product, firm-year, and country-year fixed effects. In columns of "Homogenous" and "Differentiated," we restrict sample products only to non-differentiated products and differentiated products, respectively. "Low" and "High" indicate our restriction of sample import countries only to low income countries and high income countries, respectively.

We estimate the same model according to product type (i.e., homogenous or differentiated) and income level (i.e., high or low) in import countries. Those results are also shown in Table 5. While all coefficients are insignificant in estimations for homogenous products, input and output tariffs exhibit a significantly negative relationship with export quality for differentiated products. This contrasting result regarding input tariffs for homogenous and differentiated products is consistent with the findings in Bas and Strauss-Kahn (2015); namely, that the effects of trade policy on export product quality are more important for differentiated products. Input tariffs have a significantly negative influence on export product quality when exporting to both low- and high-income countries, while the coefficient for output tariffs is significant only for high-income import countries. As discussed in Section 2.4, a reduction of output tariffs has an ambiguous effect on firms' incentives to upgrade their product quality. As Antoniades (2015) suggests, increased competition in domestic markets through a reduction in output tariffs raises high-productivity firms' incentives to upgrade quality. Our finding suggests that exporters to high-income countries tend to have better productivity because they face tougher competition in these countries. It also

might indicate that the technology imitated from high-quality imported products is more important when exporting to high-income countries.[18]

4.3. Robustness Checks

In order to obtain robust estimates, we deal with the following measurement and econometric issues. The first focuses on "surviving observations". Some firm-product-country observations appear or disappear during our sample period. To confirm that such entries and exits do not affect our results, the "2000 & 2006" column in Table 6 restricts the above observations to those that exist in both these years. Furthermore, in the "3-year" column, we restrict observations to those existing for all of 2000, 2003, and 2006. Both columns show the significantly negative coefficients associated with variables for input and output tariffs, the same as for differentiated products and high income countries in Table 5, although positively significant tariff coefficients in destination countries are difficult to interpret. We also exclude export price outliers. Specifically, we drop observations with (over a five-time difference in export price) compared with the average HS six-digit code, destination country, and firm. These results are shown in the "Outliers" column in Table 6. Here, coefficients for input and output tariff variables also are significantly negative. However, unlike the result in the "All" column in Table 5, services' restrictiveness has an insignificant coefficient.

Our variables on input tariffs and services' restrictiveness may suffer from an endogeneity problem, resulting from the use of input share as a weight. Specifically, such a share might be related to industry characteristics. For example, if industries with relatively high-quality products rely more on specific services, cross-industry variation in the service restriction index might reflect cross-industry variation in product quality. To mitigate this problem, we follow the strategy adopted in Bas (2014) and Bas and Causa (2013), which uses weights computed using the IO table in a different country (the U.S., in those papers). In our study, we use weights based on the IO table in Japan, a neighbouring country. The results are shown in the "Weight" column in Table 6. As in the "All" column in Table 5, coefficients for input tariffs and service restrictiveness are again significantly negative, whereas the coefficient for output tariffs is not insignificant.

[18] In the Appendix, we report the estimation results for quality-adjusted price. Naturally, the coefficients are likely to be positive.

Table 6. Robustness Checks

	2000&2006	3-year	Outliers	Weight
Tariff in Destination	1.8203*	1.9790*	-0.7702	-0.2715
	[1.0824]	[1.1999]	[0.6774]	[0.4815]
Input tariff in China	-13.9581***	-14.6236***	-14.5200***	-16.5815***
	[2.6851]	[3.0785]	[2.1627]	[2.4225]
Output tariff in China	-1.7994**	-1.4841*	-1.2795*	-0.8011
	[0.8604]	[0.8507]	[0.7260]	[0.7160]
Services restrictiveness	-2.5639	-2.1849	-1.3532	-3.6686***
	[1.6593]	[1.6767]	[0.8772]	[0.8997]
Number of observations	116,437	95,043	450,439	413,934
Adjusted R-squared	0.9374	0.944	0.9303	0.9282

Notes: A dependent variable is a log of export quality. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. Parentheses are standard errors clustered by HS eight-digit code. In all specifications, we include firm-country-product, firm-year, and country-year fixed effects. In the "2000 & 2006, column, we restrict our observations about a firm's product in a country to those that exist in both 2000 and 2006. In the "3-year" column, we include observations that exist in all three years: 2000, 2003, and 2006. "Outliers" excludes outliers defined by export price (i.e., observations greater or smaller than five times the difference in export prices, compared with the average of HS six-digit code, destination country, and firm). In the "Weight," column we use weights computed using Japan's IO for input tariffs and services' restrictiveness.

4.4. Firms' Ownership Types

We also examine the effects of trade policy on export product quality, according to firms' ownership types, including SOE, private company, and FOE. Specifically, we introduce interaction terms for each trade policy variable, with an ownership dummy. The results, shown in Table 7, contain four noteworthy points.

First, although a significant result exists for private companies exporting to low-income countries, tariffs in export destination countries generally do not significantly affect export quality by type of firm. Because this variable does not have a significantly negative relationship with export quality upgrades in all specifications (except in the above case), we conclude that a reduction of tariff rates in destination countries does not have a significant effect on export product quality. As shown in Tables 3 and 4, this variable is also insignificant when we use export prices as the dependent variable, implying that a reduction of tariff rates in destination countries may not change export prices. If so, export firms' profits remain largely the same, and there is no incentive to upgrade products.

Table 7. Estimation Results by Ownership Types: Quality

	All	Homogenous	Differentiated	Low	High
Tariff in Destination					
[Type = SOE]	-0.1882	0.7523	-0.4343	0.3567	-0.735
	[0.8252]	[1.0095]	[1.1974]	[1.0014]	[0.9414]
[Type = Private]	-0.968	1.3198	-1.4407	-1.7053*	2.2345
	[0.9134]	[0.9685]	[1.2497]	[0.9738]	[1.6205]
[Type = FOE]	-1.3321	-0.9206	-1.5273	-1.1026	0.7552
	[0.9135]	[1.0455]	[1.2995]	[1.1261]	[0.9500]
Input tariff in China					
[Type = SOE]	-13.9553***	-6.8527	-15.6466***	-12.3878	-13.8752***
	[2.3155]	[6.3063]	[2.5140]	[8.9627]	[2.1396]
[Type = Private]	-27.3298***	2.229	-26.3733***	-18.7485	-28.9906***
	[6.2582]	[11.1218]	[6.6467]	[17.0943]	[5.8574]
[Type = FOE]	-16.1609***	-5.0217	-19.0875***	-40.2794***	-14.0520***
	[3.2017]	[5.5518]	[3.5812]	[12.0109]	[3.2145]
Output tariff in China					
[Type = SOE]	-0.7194	0.6207	-1.2844	-0.1124	-1.0364
	[0.7523]	[2.0178]	[0.8070]	[2.2532]	[0.9171]
[Type = Private]	-4.4623***	-6.0876**	-5.1082***	-9.5475**	-3.2059**
	[1.5533]	[3.0142]	[1.6560]	[3.7311]	[1.6143]
[Type = FOE]	-2.0785*	-0.3261	-3.2497***	1.7166	-2.6807**
	[1.0656]	[2.6481]	[1.0369]	[2.2213]	[1.1500]
Services restrictiveness					
[Type = SOE]	-0.3537	-0.0705	-0.1243	-0.2945	-0.4459
	[1.1107]	[2.8563]	[1.2354]	[3.6454]	[1.0732]
[Type = Private]	-1.9909	1.0019	-2.2298	-2.4937	-1.8541
	[1.8199]	[2.6744]	[2.0629]	[3.7531]	[1.9385]
[Type = FOE]	-2.2203**	-1.8591	-2.7327**	-4.7495	-1.9535*
	[1.1190]	[2.7000]	[1.2254]	[3.4728]	[1.1649]
Number of observations	463,512	76,063	378,899	79,110	373,430
Adjusted R-squared	0.9264	0.95	0.9193	0.9042	0.9295

Notes: A dependent variable is a log of export quality. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. Parentheses are standard errors clustered by HS eight-digit code. In all specifications, we include firm-country-product, firm-year, and country-year fixed effects. In columns of "Homogenous" and "Differentiated," we restrict sample products only to non-differentiated products and differentiated products, respectively. "Low" and "High" indicate our restriction of sample import countries only to low income countries and high income countries, respectively.

Second, coefficients for input tariffs in China are significantly negative in several cases. The absolute magnitude is largest for private companies and smallest for SOEs. This suggests that SOEs are less sensitive to changes in trade policy, probably because their operations are mostly directed by either central or local authorities. Nevertheless, almost all estimated results find that input tariff variables have a significantly negative coefficient, which is consistent with the

theoretical prediction in Section 2.2. This indicates that trade liberalization in input markets effectively reduces exporting firms' production costs, improves the quality of inputs, and increases their incentives to upgrade output quality. Furthermore, its absolute magnitude is much larger than that for other variables, revealing that lower input tariffs can be a highly effective policy for raising export product quality.

Third, for private or foreign-owned exporters, output tariffs in China have a significantly negative relationship with export quality. This result may be similar to SOEs' lower trade policy sensitivity. As indicated in Section 2.3, intensified competition promotes quality upgrading by low-cost firms and is more relevant for private companies or FOEs. By comparison, SOEs are impacted less and therefore remain less productive. We find a larger absolute magnitude for this coefficient for private companies than for FOEs. This suggests that the escape competition effect described in Section 2.3 is larger for private companies than for FOEs, probably because the parent companies of FOEs can export to China, and their products must cause no harm to Chinese FOEs.

Finally, lowering services' restrictiveness significantly raises the export product quality of FOEs, particularly for differentiated products exported to high-income countries. Throughout our empirical analyses in this study, the coefficients for liberalization of services largely were insignificant. However, our results indicate that they do have a significant effect for FOEs. This is consistent with the theoretical prediction in Section 2.4, implying that foreign-owned services providers tend to engage in businesses with manufacturing FOEs, perhaps those with the same nationality.

5. Concluding Remarks

In this paper, we empirically examined the effects of liberalization of services, along with various trade policy measures on export quality, using firm-level export data in China. Empirical results demonstrate that fewer FDI services' restrictiveness raises export product quality, mainly in FOEs. Therefore, sufficient technological spillover from FOEs to indigenous firms would play an important role for liberalization of services to affect economic growth. Among other trade policies, input tariff reduction is the one that most efficiently raises export product quality. Output tariff reduction is effective, but only for exporters to high-income countries. Trade liberalization in the destination country, however, does not contribute to raising quality. These results indicate that domestic trade reforms, especially trade liberalization in input markets, are important for economic development driven by quality upgrades.

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Appendix. Estimation Results for Quality-Adjusted Prices

	All	Homogenous	Differentiated	Low	High
Tariff in Destination	0.6846	-0.236	0.878	0.466	-0.5505
	[0.6619]	[0.6499]	[0.9399]	[0.7296]	[0.7592]
Input tariff in China	15.3993***	5.5609	17.1683***	18.9127**	14.8931***
	[2.0865]	[4.3593]	[2.2245]	[7.8055]	[1.9498]
Output tariff in China	1.1389*	-0.1273	1.9424***	0.625	1.3700*
	[0.6758]	[1.5467]	[0.6656]	[1.8183]	[0.7324]
Services restrictiveness	1.4236	0.6099	1.5386	1.0767	1.4708
	[0.9201]	[1.9219]	[1.0365]	[2.4435]	[0.9655]
Number of observations	463,512	76,063	378,899	79,110	373,430
Adjusted R-squared	0.9334	0.9532	0.9276	0.9179	0.9355

Notes: A dependent variable is a log of quality-adjusted price. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. Parentheses are standard errors clustered by HS eight-digit code. In all specifications, we include firm-country-product, firm-year, and country-year fixed effects. In columns of "Homogenous" and "Differentiated," we restrict sample products only to non-differentiated products and differentiated products, respectively. "Low" and "High" indicate our restriction of sample import countries only to low income countries and high income countries, respectively.