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Trade Elasticity of China

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This paper presents a simple methodology to approximate trade elasticity of China by only using her 2016 firm-level trade data, wherein the exporting country is replaced by the country' most populous destination (a base country) when calculating the export intensity. With Hong Kong being the base country, the estimated trade elasticity to China exports is $\theta = 8.78$ (if $\sigma = 6.56$). This methodology also provides a way to examine the relative "resistance" of a country's trading partners while taking them as the base countries: the larger their estimated trade elasticity, the greater their resistance to trade.

Key Words: Trade elasticity; China.
JEL Classification Numbers: F11, F17.

1. INTRODUCTION

A gravity model can be derived from a framework with the characteristics of Constant Elasticity of Substitution (CES) preferences, differentiated goods in monopolistic competition, and iceberg trade costs. This type of model leads to a simple estimate of the gains from trade (e.g., Krugman, 1979, 1980; Anderson and Van Wincoop, 2003). The gains from trade are crucially determined by the domestic demand share and the elasticity of imports with respect to variable trade costs, that is, the trade elasticity. In this type of model, with differentiated but similar firms, the trade elasticity equals the elasticity of substitution (σ) minus one as $\sigma - 1$.

However, firms are heterogeneous in terms of productivity. It has been well documented that the Pareto distribution is a good approximation of the distribution of firms productivities. Empirical evidence can be found

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in studies of U.S. firms by Axtell (2001) and Luttmer (2007), among others. The Pareto distribution $G(\theta)$ is characterized by a share parameter, θ, which measures the degree of firm heterogeneity. When firms are heterogeneous in terms of productivity, drawn from either a Pareto distribution under monopolistic competition or a Fréchet distribution under perfect competition, Eaton and Kortum (2002) and Chaney (2008) have respectively shown that the trade elasticity is replaced by the share parameter θ, and the impact of the elasticity of substitution on trade disappears.

Empirically, Eaton and Kortum (2002) use retail prices in 19 OECD countries for 50 manufactured products to obtain a mean estimate of trade elasticity $\theta = 8.28$, ranging from 3.6 to 12.86, while Romalis (2007) examines the NAFTA countries to obtain an estimate with a range from 6.2 to 10.9. Costinot, Donaldson and Komunjer (2012) extend Eaton and Kortum's (2002) model to a multi-sector one and obtain an estimate of the trade elasticity $\theta = 6.6$. Arkolakis et al. (2008) examine data for Costa Rica and find that the trade elasticity is $\theta = 4$ if Klenow and Rodríguez-Clare's (1997) estimate of $\sigma = 4.8$ for Costa Rica is taken as given.

Simonovska and Waugh (2014) argue that there is an upward bias in Eaton and Kortum's (2002) estimate due to their small sample size. They instead obtain an estimate of trade elasticity of about $\theta = 4$ when the small sample problem is taken into account. Their evidence suggests that the measure of θ might dramatically decrease with the sample size. This argument seems to find support in French data. Using data from French, Eaton, Kortum and Kramarz (2011) first obtain an estimate of the elasticity of substitution of $\sigma = 2.98$ and then use it to calculate the trade elasticity as $\theta = 4.87$. Using the same French firm-level data, Arkolakis (2010) obtains an estimate of trade elasticity of $\theta = 8.28$ when assuming that $\sigma = 6.56$. If Eaton, Kortum and Kramarz's (2011) estimate of $\sigma = 2.98$ is taken as given, the estimated trade elasticity by Arkolakis (2010) drops to $\theta = 2.95$.

The purpose of this paper is to estimate the trade elasticity of China in order to understand the distribution of productivity among Chinese firms. However, the methodology in the current literature requires not only firm-level exports but also firms domestic sales data to calculate the trade elasticity. Unfortunately, to my knowledge, there have been no reliable sources of Chinese data on firm-level domestic sales so far. What we currently have is the Chinese firm-level trade data from the China Commodity Trade Database, which reports 171,205 firms engaged in exporting. Due to the limitations of the data, I alternatively develop a new methodology to approximate the trade elasticity by merely using firms' export data.

To this end, I rewrite the Chaney (2008) model by incorporating Arkolakis's (2010) formulation of market access costs. However, to focus on the analysis, I assume full access once firms enter a destination. Furthermore, I recast the export intensity in both Arkolakis (2010) and Eaton, Kortum and Kramarz (2011) by choosing a reporting country's most populous destination as the base country to replace the exporting country when calculating the export intensity. This new methodology allows us to approximate the trade elasticity by simply using firm-level trade data. With Hong Kong serving as the base country, my benchmark estimate of the trade elasticity is $\theta = 8.78$ with respect to China's exports if assuming that $\sigma = 6.56$. If Eaton, Kortum and Kramarz's (2011) estimate of $\sigma = 2.98$ is taken as given, the estimated trade elasticity of China becomes $\theta = 3.13$. The estimation is very close to the estimation in the literature (e.g., Arkolakis, 2010; Eaton, Kortum and Kramarz, 2011).

Section 2 illustrates how the new methodology is derived. Section 3 reports the empirical results when this new methodology is applied to examine China's firm-level export data. Section 4 concludes.

2. THE MODEL

The first part in this section presents a simplified revision of Chaney's (2008) model with the market access costs of Arkolakis (2010) being incorporated, in which we get the export intensity.[1] In the second part, I introduce the base country to form a different type of export intensity in order to cope with real data of China.

Let us denote the exporting countries by c and the importing country by j, where $c, j = 1, \ldots, N$. I simplify Chaney's model by assuming away the homogenous good. Utility is aggregated by a CES preference with a continuum of differentiated goods:

$$U = \int_{\Omega} q(\omega)^{(\sigma-1)/\sigma} d\omega, \tag{1}$$

where the elasticity of substitution $\sigma > 1$. Given a measure L_j of identical consumers in the destination country j, the demand for the good produced by a firm with productivity ϕ from the sourcing country c charging a price $p_{cj}(\phi)$ in the country j is

$$q_{cj}(\phi) = p_{cj}(\phi)^{-\sigma} P_j^{\sigma-1} y_j L_j, \tag{2}$$

where $P_j^{1-\sigma} = \int_{\omega \in \Omega_j} [p_{cj}(\omega)]^{1-\sigma} d\omega$ is the price index and y_j is per capital income in country j. In country j, each consumer $l \in [0, L_j]$ has access to a potentially different set of goods Ω_j.

[1]I am grateful to Professor Andrs Rodríguez-Clare for the lecture he delivered at UC, Berkeley in 2013 on the derivation of this part that I have referred to. I am responsible, however, for any remaining errors.

In a representative country c, firms draw productivity from a given Pareto distribution with a share parameter $\theta : G_c(\phi) = 1 - (b_c/\phi)^\theta$, where $\theta > \sigma - 1$ and b_c is a country-specific positive level parameter.[2] All firms in each country produce goods using only labor. Each consumer earns a labor wage w_j and profits from his/her ownership of a firm π_j, such that his/her total income is $y_j = w_j + \pi_j$. Assuming a symmetric equilibrium in Pareto distribution, profits and wages can be expressed as a constant share of income, such that $\pi_j = \frac{\sigma-1}{\sigma\theta-(\sigma-1)} w_j$. As a result, the labor market equilibrium leads to $y_j = \frac{1}{1-\eta} w_j$, where $\eta = \frac{\sigma-1}{\sigma\theta}$.

A potential market in country j for a firm with productivity ϕ is $p_{cj}(\phi)q_{cj}(\phi)$. As in Chaney (2008), exports incur an exogenous fixed cost f_{cj} in units of labor in the destination country j from country c. Specifically, Arkolakis (2010) presumes that the Chaney's fixed market access costs are positively related to the market size of the destination country. Particularly, Arkolakis (2010) endogenizes Chaney's fixed market access costs and argues that greater marketing efforts are required to gain a larger market share. To focus our analysis, I take a middle ground and simplify the cost formulation in Arkolakis's (2010) model by removing its endogenous market share, such that all the consumers in country j (i.e., L_j) are able to be reached by a firm of type ϕ from country c once the firm accesses this market. This returns to the Chaney's fixed market access costs that is just a destination-country-specific version. Thus, a type ϕ firm maximizes its profits, with (2), by

$$\pi_{cj}(\phi) = p_{cj}(\phi)q_{cj}(\phi) - \frac{w_c}{\phi}\tau_{cj}q_{cj}(\phi) - w_c^\gamma w_j^{1-\gamma}\frac{L_j^\alpha}{\psi}, \tag{3}$$

where $\tau_{cj} \geq 1$ denotes the iceberg trade cost for transporting one unit of goods from country c to country j and only a fraction $1/\tau_{cj}$ arrives.

2.1. Equilibrium

Each firm charges a mark-up $\sigma/(\sigma - 1)$ over its marginal cost, hence

$$p_{cj}(\phi) = \frac{\sigma_j}{\sigma_j - 1}\frac{w_c}{\phi}\tau_{cj}. \tag{4}$$

The zero profit condition in (3), $\pi_{cj}(\phi^*_{cj}) = 0$, leads to:

$$\phi^*_{cj} = (w^{1-\gamma} - cw_j^\gamma)^{\frac{1}{(\sigma-1)}} \left[\frac{\sigma}{\bar{\sigma}}\left(\frac{L_j^{\alpha-1}}{\psi}\right) y_j^{-1}\right]^{\frac{1}{(\sigma-1)}} P_j^{-1} w_c \tau_{cj}, \tag{5}$$

[2]As in Arkolakis (2010), we have $b_c \leq \min_j \phi^*_{cj}$ to ensure a positive distribution of the sales of firms, where ϕ^*_{cj} is the productivity threshold that we will discuss latter.

where $\bar{\sigma} = (\sigma/(\sigma-1))^{1-\sigma}$. Chaney (2008) does not impose free entry, but assumes that the total mass of potential entrants in a country is proportionate to the market size of this country. Instead, we return to Melitz's (2003) model to allow free entry, and assume an entry cost f_{ce}. Combining the labor market equilibrium and the free entry condition, we obtain $\eta w_c L_c = M_c w_c f_{ce}$, where $M_c = \eta L_c / f_{ce}$ denotes the total mass of potential entrants in country c.

The firm's export to country j, with (2), (4), and (5), is then given by

$$x_{cj}(\phi) = \sigma w_j^{\gamma} w_c^{1-\gamma} \left(\frac{L_j^{\alpha}}{\psi}\right) \left(\frac{\phi_{cj}^*}{\phi}\right)^{1-\sigma}, \tag{6}$$

where $\phi \geq \phi_{cj}^*$ and $x_{cj} = 0$ otherwise. The total exports from country c to j are

$$X_{cj} = M_{cj} \sigma w_j^{\gamma} w_c^{1-\gamma} \left(\frac{L_j^{\alpha}}{\psi}\right) \left(\frac{1}{1-\tilde{\theta}^{-1}}\right), \tag{7}$$

where $\tilde{\theta} = \theta/(\sigma-1)$. Here, $M_{cj} = M_c(b_c/\phi_{cj}^*)^{\theta}$ denotes the measure of firms in country c that export to j.

2.2. Export Intensity

In (7), the average sales of firms in country c that export to j is

$$\overline{X}_{cj} \equiv \frac{X_{cj}}{M_{cj}} = y_j^{\gamma} L_j^{\alpha} y_c^{1-\gamma} \tilde{\psi}^{-1} \left(\frac{1}{1-\tilde{\theta}^{-1}}\right), \tag{8}$$

where $\tilde{\psi} \equiv \sigma(1-\theta)/\psi$. In (6), the total domestic sales of firms from country c that sell in country j is

$$X_{cc|j} = M_{cj} y_c^{\gamma} L_c^{\alpha} y^{1-\gamma} c \tilde{\psi}^{-1} \left(\frac{(\phi_{cj}^*/\phi_{cc}^*)^{(\sigma-1)}}{1-\tilde{\theta}^{-1}}\right) \tag{9}$$

Since $M_{cc|j} = M_c(\frac{b_c}{\phi_{cj}^*})^{\theta}$ and $M_{cc} = M_c(\frac{b_c}{\phi_{cc}^*})^{\theta}$, we have $\frac{M_{cc|j}}{M_{cc}} = \frac{M_{cj}}{M_{cc}} = (\frac{\phi_{cj}^*}{\phi_{cc}^*})^{-\theta}$. Following both Arkolakis (2010) and Eaton, Kortum, and Kramarz (2011), it is easy to obtain their normalized export intensity in a simplified form:

$$\frac{\overline{X}_{cc|j}}{\overline{X}_{cc}} = \left(\frac{M_{cj}}{M_{cc}}\right)^{-\frac{\sigma-1}{\theta}}. \tag{10}$$

Eq. (10) implies that, for the firms that are able to export to a country, the smaller the mass of potential entrants in that country, the greater their average sales at home.

The purpose of this paper is to estimate the trade elasticity with respect to China's exports. However, this task, as implied in (10), requires Chinese data on firm-level domestic sales (i.e., $\overline{X}_{cc|h}$). To my knowledge, there are currently no reliable sources from which to obtain the domestic sales data.[3] Therefore, I rewrite the export intensity in (10) by replacing the firms' domestic sales with their exports to the sourcing country's most populous destination (a base country) as follows.

The first step is to obtain the total sales of firms in country j of firms from country c that are able to sell in a base country h:

$$X_{cj|h} = \int_{\phi^*_{ch}}^{\infty} \sigma w_j^{\gamma} w_c^{1-\gamma} \left(\frac{L_j^{\alpha}}{\psi}\right)\left(\frac{\phi^*_{cj}}{\phi}\right)^{(1-\sigma)} dG(\phi) \quad (11)$$

$$= M_{ch} y_j^{\gamma} L_j^{\alpha} y_c^{1-\gamma} \tilde{\psi}^{-1} \left(\frac{(\phi^*_{ch}/\phi^*_{cj})^{(\sigma-1)}}{1-\tilde{\theta}^{-1}}\right). \quad (12)$$

In (11), the mean sales of firms in country j of firms from country c that are able to sell in the base country h is

$$\overline{X}_{cj|h} \equiv \frac{X_{cj|h}}{M_{cj}} = y_j^{\gamma} L_j^{\alpha} y_c^{1-\gamma} \tilde{\psi}^{-1} \left(\frac{(\phi^*_{ch}/\phi^*_{cj})^{(\sigma-1)}}{1-\tilde{\theta}^{-1}}\right). \quad (13)$$

Similarly, the mean sales of firms in country h of firms from country c is

$$\overline{X}_{ch} \equiv \frac{X_{ch}}{M_{ch}} = y_h^{\gamma} L_h^{\alpha} y_c^{1-\gamma} \tilde{\psi}^{-1} \left(\frac{(\phi^*_{ch} \cdot \phi^*_{cc})^{(\sigma-1)}}{1-\tilde{\theta}^{-1}}\right). \quad (14)$$

With (12) and (13), the mean sales in j of firms from c that sell in h relative to mean sales in h by all firms from c is

$$\frac{\overline{X}_{cj|h}}{\overline{X}_{ch}} = \frac{y_j^{\gamma} L_j^{\alpha}}{y_h^{\gamma} L_h^{\alpha}} \left(\frac{\phi^*_{cc}}{\phi^*_{cj}}\right)^{(\sigma-1)} = \frac{y_j^{\gamma} L_j^{\alpha}}{y_h^{\gamma} L_h^{\alpha}} \left(\frac{M_{cj}}{M_{cc}}\right)^{\frac{\sigma-1}{\theta}}. \quad (15)$$

We then obtain a different type of export intensity with a base country being incorporated. In comparison to Eq. (10), Eq. (14) implies that, for the firms that are able to export to a base country, the greater the mass of

[3]The Chinese Industrial Enterprises (CIE) Database reports the output for 390,771 firms in 2006, such that we could calculate their domestic sales from deducting their total exports. However, the CIE dataset suffers from problems of data matching, measurement errors, unrealistic outliers, definition ambiguities, underreporting to escape taxes, etc (e.g., Huihua et al. 2012). By examining Eq. (10) with these data, the estimated trade elasticity with respect to China's exports goes up to $\theta = 22.6$ when $\sigma = 6.56$. The result is dubious.

potential entrants in a country, the larger will be their average exports to that country relative to their average exports to the base country.

3. EMPIRICAL MODEL AND RESULTS

Taking logarithms of (14) to obtain a regression model:

$$\ln\left(\frac{\overline{X}_{cj|h}}{\overline{X}_{ch}}\right) = \xi + \gamma \ln y_j + \alpha \ln L_j + \frac{\sigma - 1}{\theta} \ln\left(\frac{M_{cj}}{M_{ch}}\right) \tag{16}$$

where $\xi = \ln(y_h^{-\gamma} L_h^{-\alpha} y_c^{-1+\gamma})$ and c denotes the exporting country (e.g., China) and $h \neq c$ represents the base country (e.g., Hong Kong). Currently, we have Chinese firm-level trade data from the China Commodity Trade Database, which reports 171,205 firms' exports to 218 different destinations. The data on population and per capita GDP across countries are from the World Bank. Having only these firm-level trade data, we can use (15) to estimate θ for China if we have a proper base country.

Similar to the firms in the U.S. and France, assume that the firms located in China follow a Pareto distribution in productivities. For Chinese firms, each trading partner has a country-specific productivity threshold that requires the minimum productivity of firm for exporting (i.e., ϕ_{cj}^*, $\forall j$), and $\phi_{ch}^* \geq \phi_{cc}^*$ for all $h \neq c$.

A higher θ implies more homogeneity, in the sense that more output is concentrated among the smallest and least productive firms. That is, small productive firms represent a greater fraction of firms, implying a larger share parameter θ. Therefore, in (15), before estimating China's share parameter θ, we should truncate all of the Chinese firms whose productivity are less than ϕ_{ch}^* but greater than ϕ_{cc}^*, thus leading to an upward bias in the estimate of the trade elasticity. Therefore, in order to reduce the upward bias in the estimation of θ, we should choose a base country h whose ϕ_{ch}^* is mostly closed to ϕ_{cc}^*. Based on this concern, Hong Kong is the best candidate to serve as the base country in the case of China.

First of all, as one of the worlds largest trading economies, Hong Kong is a free port that thrives on free trade. Hong Kong has served as an international hub to intermediate a substantial part of the trade between China and the rest of the world over many decades. Secondly, at least politically, Hong Kong, is a part of China. Furthermore, Hong Kong signed a free trade agreement with China, known as the Closer Economic Partnership Arrangement (CEPA), in 2003. With the CEPA, qualifying products and firms enjoy preferential access to each others market, and many of the preferences surpass the concessions made by China upon its accession to the WTO. Finally, transportation between China and Hong Kong is easy and convenient by way of air, sea, and rail transport. People can even take a

TABLE 1.

Chinese Firms Exporting to the Six Most Popular Destinations

Export Destination	Number of Exporters	Fractions of Exporters
United States	76,081	0.444
Hong Kong	61,958	0.362
Japan	57,453	0.336
Germany	44,490	0.260
South Korea	48,991	0.286
United Kingdom	39,429	0.230
All destinations (all Chinese exporters)	171,205	

bullet train or a coach to Shenzhen, a city in Guangdong Province in China. By putting all of these advantages together, I argue that the productivity threshold of Hong Kong ϕ^*_{ch} should be the least for Chinese exports, in comparison to other Chinese trading partners, as $\phi^*_{cc} \leq \phi^*_{ch} < \phi^*_c j$, $\forall j \neq h, c$.

TABLE 2.

Empirical Results Based on the Chinese Trade Data in 2006

Model	Model (1) Hong Kong	Model (2) U.S.	Model (3) Japan	Model (4) S. Korea	Model (5) Germany	Model (6) U.K.
Population	0.1163***	0.1286***	0.1473***	0.2426***	0.2406***	0.1780***
	(.0005)	(.0007)	(.0007)	(.0008)	(.0008)	(.0007)
PPGDP	0.0839***	0.0616***	0.0924***	0.2183***	0.1777***	0.1859***
	(.0007)	(.0008)	(.0009)	(.0008)	(.0009)	(.0007)
$\ln(M_{cj}/M_{ch})$	0.6331***	0.5431***	0.5464***	0.3691***	0.3547***	0.3727***
	(.0009)	(.0012)	(.0013)	(.0012)	(.0014)	(.0011)
_cons	−3.2395***	5.0503***	4.7130***	3.5748***	−5.9979***	4.0498***
	(.0150)	(.0092)***	(.0112)	(.0113)	(.0224)	(.0092)
$Prob > F$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.6632	0.6035	0.6279	0.5973	0.8729	0.6429
No of Obs.	840,802	1,084,112	794,512	766,956	873,773	809,182
Implied θ (assume $\delta = 6.56$)	8.78	10.24	10.18	15.06	15.68	17.00

Note: *** denote the significance levels at 1%.

There were 61,958 manufacturing firms located in China that exported to Hong Kong in 2006. These firms accounted for 36% of the firms located in China that were engaged in exports, and they sold goods to 216 destinations, including Hong Kong itself, out of a total of 218 destinations, as shown in Table 1. By using (15) to approximate the trade elasticity of China, Table 2 reports the benchmark estimation of θ when taking Hong Kong as the base country in Model (1). Arkolakis (2010) presumes that

$\sigma = 6.56$ and use French data to obtain an estimate of the trade elasticity of $\theta = 8.28$. If it is assumed that $\sigma = 6.56$, the estimation of the trade elasticity with respect to China's exports is $\theta = 8.78$. The estimation is very close to and only slightly greater than that in the case of France in the literature. All of the estimated parameters exhibit the right signs and are highly significant. However, the estimates on the population and per capita GDP are 0.12 and 0.08, respectively, which are much lower than what Arkolakis (2010) obtained for France (i.e., 0.29 and 0.43).

As depicted in Table 1, the most popular destination for China's exports is the U.S., followed by Hong Kong, Japan, South Korea, Germany, with the U.K. being ranked sixth. Since these countries are among the most popular destinations for China's exports, the productivity thresholds in these countries might be among the smallest for China's exporting firms. Nevertheless, as argued above, these trading partners should have higher productivity thresholds for China's exporting firms than these firms domestic sales, such that the estimation of the trade elasticity would be biased upward if using Eq. (15) rather than Eq. (10) to estimate the trade elasticity.

Table 2 reports the estimations in sequence. If the U.S. is used as the base country, the estimated trade elasticity climbs up to $\theta = 10.24$ as shown in Model (2), which is greater than the estimate of $\theta = 8.78$ when Hong Kong is taken as the base country. If Japan is used as the base country, Model (3) reports an estimate of the trade elasticity of 10.18. If the base country is South Korea, Germany, and the U.K., the estimated trade elasticity goes up to 15.06, 15.68, and 17.0, respectively, as shown in Table 2.

As predicted, with the presumption that $\phi^*_{cc} \leq \phi^*_{ch} < \phi^*_{cj}$, $\forall j \neq h, c$, the more the small productivity firms are truncated while taking the other remote countries rather than Hong Kong as the base country, the smaller is the proportion of high productivity firms, and then the larger the estimate of the trade elasticity. Since accessing Hong Kong should incur a slightly higher productivity threshold than China for Chinese firms, this estimate of $\theta = 8.78$, even if it is being biased upward, should be a good approximation of the "actual" trade elasticity with respect to China's exports.

4. CONCLUSIONS

I have presented a simple methodology to approximate trade elasticity by using only firm-level trade data, in which the exporting country is replaced by the country's most populous destination (a base country) when calculating the export intensity. When Hong Kong is used as the base country, I obtain an estimate of the trade elasticity of $\theta = 8.78$ with respect to China's exports if it is assumed that $\sigma = 6.56$. This estimate is within the ranges of other studies (e.g., Eaton and Kortum, 2002 and Arkolakis, 2010). Although this is definitely not a generally applicable methodology to estimate trade elasticity, considering lacking in reliable data of "firm-level domestic sales", this methodology provides an alternative to approximate the trade elasticity.

A large θ indicates that, ceteris paribus, large productive firms represent a greater fraction of firms. The base country's "resistance" to imports, in the words of Anderson and Van Wincoop (2003), is presented as the productivity threshold for importing entrants. The larger the resistance of a country to imports, the greater is its productivity threshold, in which case the more small productive firms will be "cut off" from accessing the country. As a result, the estimated trade elasticity is biased upward if a more "resistant" country is chosen as the base country.

Therefore, this methodology also provides a way of examining the relative "resistance" of a country's trading partners when taking them as the base countries: the larger their estimated trade elasticity, the greater their resistance to the sourcing country's exports. For example, Japan is ranked the third largest country with respect to China's exports, followed by South Korea. As shown in Table 2, after controlling for market sizes, the estimated trade elasticity is 10.18 and 15.06 if Japan and South Korea are the base countries, respectively. This may imply that South Korea is more resistant than Japan to China's exports. As another example, the estimated trade elasticity of the U.S. and Japan are quite similar as shown in Table 2, if geography is taken into consideration, Japan is more resistant than the U.S. to China's exports.

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