# Who Is More Sustainable: Domestic or Foreign Consumption?

## An empirical investigation on the relationship between consumption, export and pollution emission in China

**Competitive Paper**

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## Abstract

This paper is trying to answer two questions. First, is there any relation between consumption and environment problems, or in other words, are consumers responsible to environment problems? Second, in neo-classic trade theory, there's a debating on whether export trade will cause environment deteriorating of exporting countries, especially developing exporting countries. Nearly all of the existing research addressing this problem without consideration of exporting countries own consumption. Then this paper will investigate the relationship between export trade and environment deteriorating, with the consideration of exporting countries' own consumption.

This paper first reviews the literature on trade, environment pollution and socially responsible consumption and green marketing. Then using economic modeling method, this paper theoretically illustrates the relationship between consumption, export and environment deteriorating. After the empirical data of China's consumption, exporting and pollution emission, the paper finds evidences that support the theoretical prediction: there's significant relationship between consumption, exporting and environment deteriorating. That is, if consumption is more sustainable, there will be less pollution. Second, in China, the consumption on home alliances, clothing are the main reasons of environment deteriorating, in other words, Chinese consumers' consumption on home appliances and clothing is un-sustainable. Third, exporting can cause environment deteriorating in China. Foreign consumption is also un-sustainable for China's environment, since foreign consumers' needs cause the transfer of production of high-pollution goods to China.

Traditional economic theory imputes the environment deteriorating to production and export, our paper quantitatively shows that whether consumption is sustainable is the main reason of environment problems, and shows the importance to guide consumers to adopt more sustainable consumption goods. Second, this paper also shows exporting trade is also a main reason of environment deteriorating in China. That is, foreign consumption is also un-sustainable.

**Key Words:** Consumption Structure, Export Trade, Environment Pollution, Panel Data

***Who Is More Sustainable: Domestic or Foreign Consumption?***

## 1 Introduction

The depletion and increasing scarcity of many natural resources, along with environment deteriorating, have been and are likely to continue to be the most pressing concerns of our society, especially in the emerging markets, where countries are being highly economic growth but suffering from environment problems. Take China for example, she has been experienced high-speed economic growth for about 30 years, the disposable income of urban citizen is 2320 US dollar in 2008 averagely. But at the same time, the industrial solid waste and waste water emission are 1901.3 million tons and 241.7 billion tons. Most scholars impute this environment to China's high speed growing export trade, and some research supports this claim. But there're other scholars insist that we should investigate this question from the consumption side. Which theory is better? Our research shows that both theory are inadequate, we must consider domestic consumption and export trade at the same time. Only in this way can give us a more insightful answer.

## 2 Literature Review

### 2.1 International Trade and Environment Deteriorating

From 20 century 70s, the relationship between international trade and environment problems is being paid lots of attention. Among them, Daly represented by environmentalists that free trade would damage the ecological environment in developing countries, particularly those more relaxed environmental regulation countries. In international trade literature, there are two different perspectives. Copeland and Taylor's (1994, 755-787) studies shows that pollution-intensive export industries will transfer from developed countries to developing countries and deteriorate the environment conditions in developing countries. Since by the comparative advantage theory, higher environmental standards and tax in developed countries will make developing countries cheaper places to produce pollution-intensive products. Another perspective, such as the research of Birdcall and Wheeler (2001, 657-673), and Frankch (2003, 877-908), believe that growing international trade can help developing countries in decreasing pollutants emission and improve the environment condition. The underlying reason is that as the environment standards of developed countries getting higher, developing countries must improving their technology in order to produce more environment friendly products which can meet the standards in developed countries. Through this way, international trade can improve the technology of developing countries, and then decrease the pollutants emission in these countries. These two competing perspectives imply international trade can cause different results on environment conditions.

Since our empirical research is about China, it is worthy to mention about the studies in China. ZHU Qirong (2008, 47-51) investigates the relationship between export trade and environment pollution, environment regulation. His study shows that export trade is the main reason of China's environment problem. ZHANG Mei (2006, 78-81) shows the positive relationship between export trade and sulfur dioxide emission in Guangdong province of China. LAN Tian(2004) shows there's a negative relationship between carbon dioxide emission and export trade in China. This research shows that international trade is good for environment improvement.

The studies mentioned above give us some insights on the relationship between export trade and environment pollution, but just as pointed out by Copeland and Taylor (2004, 7-71), all these studies only focus on the production side of the economy, and there's no consideration about consumption side. In the following paragraph, we'll mention some literature which gives some insights on the relationship on consumption and environment problems.

### 2.2 Consumption and Environment Deteriorating

As Copeland and Taylor's (1995, 765-771, 2004, 7-71) studies pointed out, examining the relationship between trade and environmental pollution from the perspective of consumption and demand is not only complement existing research, but also be able to bring us new insights. Existing research examine the relationship between consumption and environmental pollution mainly from two aspects. The first is from "Socially Responsible Consumer" or "Socially Responsible Consumption" point of departure for research. Antil (1984, 18-30) study pointed out that the social responsibility of consumers determines the success of the Government's environmental policy. His research has also pointed out the characteristics of social responsible consumers and the policies government should take to raise the consumer's sense of social responsibility. Different from Antil's research, Webb, Mohr, and Harris (2008, 91-98) study focuses on an analysis of consumer behavior which is responsible for the environment. Webb et al studies suggest that socially responsible consumption behavior of three dimensions, including the purchase of those socially responsible companies' products, recycling and the purchase of those products with lower environmental pollution. Their research also noted that through their purchasing behavior consumers can affect the production decision-making process, thereby affecting production of environmental pollution. Antil (1984, 18-30) and Webb et al (2008, 91-98) studies agreed that consumer behavior actually determines the enterprise's production process, thereby determining the extent of environmental contamination. Their theories established a quantitative connection between consumption and environment deteriorating. Another stream of studies on the relationship between consumption and environment pollution are mainly based on green marketing and green consumption. According to CHEN Qijie (2004, 103-140), green consumption is the "green needs" which enables the sustainable development of human beings and the society. In other words, in order to reduce the environment pollution and establish a sustainable society, consumption must be "environment-friendly". The "Green Consumption Manual" in 1987 from British characterizes green consumption with low-pollution, energy-saving. Also,

CHEN Qijie (2004, 103-140) pointed out that the extent to which the consumption is green can be measured by how green different consumption goods is, such as food, clothing, home appliance and transportation, etc. The literature mentioned above shows that domestic consumption can be a main source of environment problem.

Based upon the literature above, we find out that both export trade and domestic consumption will cause environment pollution. But existing studies investigate the relationship between environment pollution and export trade, or between consumption and environment pollution, independently. It will be necessary to study the relationship between export trade, domestic consumption and environment pollution at the same time. This is the purpose of this paper. After building a theoretical model and doing some comparative static analysis, this paper uses the panel data of local consumption, export trade, and pollutants emission from 31 provinces in China to run an empirical test on the theoretical predictions.

## 3 Theoretical Model

In order to study the relationship between export trade, domestic consumption and environment deteriorating, we must establish a model which can include consumption and export trade at the same time. Fortunately, export trade can be viewed as the foreign consumption needs on domestic production. Now, by extending Copeland and Taylor's (1995, 765-771) model, we can build a model which can connect domestic consumption, foreign consumption and environment pollution[3]. Without loss of generality, we assume consumers are going to maximize their utilities given the budget constraint, the consumers need to solve following optimization problem:

$$\underset{\{x_i\}}{Max} U(x_1,\cdots,x_n)=\prod_{i=1}^{n} x_i^{\alpha_i}, \sum_{i=1}^{n}\alpha_i=1, \text{ subject to } \sum_{i=1}^{n} p_i x_i = I \cdots\cdots (1)$$

$I$ is the income of consumer, $x_i$ is consumer's demands on consumption goods $i$, and $p_i$ is the price of goods $i$, and consumers are price takers. Since the utility function is homogenous of degree one, we can solve problem (1) and get the following optimal solution:

$x_i = \dfrac{\alpha_i I}{p_i}$, if all the domestic consumers are with similar utility function, we aggregate the optimal demand for consumption goods $i$ across all domestic consumers, we can get the total domestic consumption on goods $i$ is given as:

$X_i = \sum_{j=1}^{M} x_i^j = \sum_{j=1}^{M} \frac{\alpha_i I^j}{p_i} = \frac{\alpha_i \sum_{j=1}^{M} I^j}{p_i} = \frac{\alpha_i Y}{p_i} \cdots\cdots (2)$, where $Y$ is the total income of domestic consumers. Now, we'll model export trade. Suppose the country we considered above exports another commodity $E$, the exporting price is $p_E$ and the value of all the exported goods is $Y_E$, then the quantity of $E$ is $X_E = \frac{Y_E}{p_E}$.

Above calculation gives the total consumption demands, includes domestic consumption and foreign consumption, on the domestic production. The consumption vector is $(X_1, \cdots, X_n, X_E) \cdots\cdots (3)$. Our analysis before told us that all the pollutants are the by-product of the production of the consumption vector (3)[4]. Extending Copeland and Taylor's (1995, 765-771) production function and assume the function form is as following:

$X_1^{\gamma_1} \square \cdots \square X_n^{\gamma_n} \square X_E^{\gamma_E} = F_1^{\alpha} F_2^{1-\alpha} \cdots\cdots (4)$, where $F_1$ and $F_2$ are production inputs. Furthermore, $F_1$ is pollution-free input and one unit use of $F_2$ will cause one unit pollution. The government will tax $z$ dollars for each unit of pollution. We define the market prices for $F_1$ and $F_2$ are $w_1$ and $w_2$ respectively. The profit maximization firm's problem then becomes, $\underset{\{F_1, F_2\}}{Min}\{w_1 F_1 + w_2 F_2 + z F_2\}$, subject to $X_1^{\gamma_1} \square \cdots \square X_n^{\gamma_n} \square X_E^{\gamma_E} = F_1^{\alpha} F_2^{1-\alpha}$, if we define $w_2 + z = w_2^{'}$, which is called full, or true price of input $F_2$. Then the optimal production plan of firm is given by the following equation:

$$\left.\begin{aligned} F_1 &= \left(\frac{\alpha}{1-\alpha}\frac{w_2^{'}}{w_1}\right)^{1-\alpha} (X_1^{\gamma_1} \square \cdots \square X_n^{\gamma_n} \square X_E^{\gamma_E}) \\ F_2 &= \left(\frac{1-\alpha}{\alpha}\frac{w_1}{w_2^{'}}\right)^{\alpha} (X_1^{\gamma_1} \square \cdots \square X_n^{\gamma_n} \square X_E^{\gamma_E}) \end{aligned}\right\} \cdots\cdots (5)$$

, since all the pollutants care caused by the use of input $F_2$ and one unit use of $F_2$ will produce one unit pollution, equation (5) establishes the relationship between domestic consumption, foreign consumption and environment deteriorating. Re-arranging $F_2$ and using some manipulation, we can get:

$$\log F_2 = \alpha \log\left(\frac{1-\alpha}{\alpha}\frac{w_1}{w_2^{'}}\right) + \sum_{i=1}^{n} \gamma_i \log\frac{\alpha_i Y}{p_i} + \gamma_E \log\frac{Y_E}{p_E} \cdots\cdots (6)$$

Equation (6) shows us that theoretically there's a relationship between domestic consumption, foreign consumption and environment pollution. It tells us that if we investigate the relationship between domestic consumption and environment pollution or between foreign consumption and environment pollution independently are inadequate. We must study the relationship between environment deteriorating and domestic consumption, foreign consumption simultaneously. Now we will interpret equation (6) in detail. On the left-side of equation (6) is the total environment pollution, it is affected by the three components on the right-side of equation (6). The first component on the right hand, the relative price of input $F_2$, $\frac{w_2^{'}}{w_1}$, and the production technology $\alpha$. If the relative price of input $F_2$ is smaller, other conditions are holding constant, the total environment pollution level will get higher. That is if the full price of $F_2$ is very low, maybe because of low government pollution tax $z$, and/or the price of $F_1$ is very high, the pollution level will be high. The production technology, $\alpha$, represents the intensity of pollution-free input use during the product process. The larger $\alpha$ is, the production is more pollution-free input intensive, the environment pollution will be lower, given other things unchanged.

The second component on the right hand of equation (6), is the domestic consumption's effects on environment deteriorating. As mentioned before, if the consumption of domestic consumers is green, there will be less environment pollution. The sustainability of domestic consumption can be showed by the second component on the right hand of equation (6), $\sum_{i=1}^{n}\gamma_i \log\frac{\alpha_i Y}{p_i}\cdots\cdots(7)$. Since consumers are basically price-takers, the value of (7) is determined by $\alpha_i$ and $\gamma_i$. When both two parameters are larger, the domestic consumption will cause higher environment pollution. In other words, if domestic consumers prefer goods which are inputs-intensive, then consumption of these goods will cause higher pollution.

Finally, similar to the domestic consumption, if foreign consumption is more inputs-intensive and the value is larger, then foreign consumption will lead to higher environment pollution. In other words, if government encourages the export trade and the exporting goods are inputs-intensive, then the exporting will cause high environment deteriorating. Using the language of equation (6), that is higher $\gamma_E$ and $Y_E$ will increase the value of this equation.

The theoretical modeling and analysis shows that there's relationship between domestic consumption, foreign consumption and environment pollution. As mentioned in the introduction, China's environment is getting worse as the high speed growth of her economic growth. Who will be responsible for the environment deteriorating, domestic consumption or foreign consumption, or both? We'll use the panel data from 31 provinces in China to get an answer and test our theoretical model at the same time.

## 4 Empirical Test

### 4.1 Data

If consumers are assumed to be price-takers and their income are exogenous, from equation (6) we can get an empirical estimation function on the relationship between domestic consumption, foreign consumption and environment pollution:

$$\log Pollution_{it} = \beta_0 + \beta_1 \log \exp ort + \beta_2 \log consumption_1 + \cdots$$
$$\cdots + \beta_{k+1} \log consumption_k + \varepsilon \cdots (8)$$

Where $\log consumption_i$ is the logarithmic value of consumption expenditure on consumption goods $i$. We classify domestic Chinese consumers' consumption expenditure into food, clothing, home appliance, health care, communication and transportation, education and entertainment, housing, and other consumption. In order to estimate equation (8), this paper uses the data of 31 provinces on consumption, export, and pollutants emission from 1995 to 2008 in China. Following two tables are some descriptive analysis of these data.

**Table 1 National pollutants emission in China**

| Year | Indutrial Waste Gas (billion $m^3$) | Industrial waste water (million tons) | Sulfur dioxide (thousand tons) | Soot (thousand tons) | Dust (thousand tons) | Solid Waste (million tons) |
|---|---|---|---|---|---|---|
| 1995 | 10747.8 | 22189.43 | 14050.207 | 8376.043 | 6379.035 | 644.74 |
| 1996 | 11119.6 | 20588.79 | 13635.743 | 7583.272 | 5615.209 | 658.97 |
| 1997 | 11337.5 | 18832.96 | 13626.293 | 6846.1 | 5483.924 | 657.5 |
| 1998 | 12120.5 | 20063.32 | 15930.212 | 11754.045 | 13221.733 | 800.43 |
| 1999 | 12680.8 | 19730.34 | 14600.95 | 9534.325 | 11752.99 | 784.4196 |
| 2000 | 13814.5 | 19424.03 | 15860.837 | 9533.316 | 9765.692 | 816.078 |
| 2001 | 16086.4 | 20260.06 | 15034.36 | 8520.862 | 8172.991 | 888.4 |
| 2002 | 17525.7 | 20718.85 | 15119.806 | 8397.377 | 7738.716 | 945.11 |
| 2003 | 19890.6 | 21225.27 | 17915.62 | 8460.745 | 9439.064 | 1004.27 |
| 2004 | 23769.6 | 22114.25 | 18916 | 8866 | 9051 | 1200.32 |
| 2005 | 26898.6 | 24311.18 | 21683 | 9491 | 9111 | 1344.5 |
| 2006 | 32857.76 | 24019.46 | 22329 | 8642 | 8084 | 1515.41 |
| 2007 | 38816.92 | 24664.93 | 21399.805 | 7711.389 | 6987.435 | 1756.316 |
| 2008 | 40386.6 | 24165.11 | 19913.691 | 6707.466 | 5849.481 | 1901.25 |

Data source: National Bureau of Statistic of China, http://www.stats.gov.cn/tjsj/ndsj/

Table 1 shows a increasing in pollutants emission since 1990s. The environment of China has been deteriorating dramatically since then, and this trend is being accelerated since 2000. Something needs to be done to prevent such an environment deteriorating. Following table 2 shows the foreign and domestic consumption from 1995 to 2008 in China.

**Table 2 National Consumption Data of China (million US dollars)**

| Year | Export/Foreign Consumption | Domestic Food Consumption | Domestic Clothing Consumption | Domestic Home Appliance Consumption | Domestic Health Care Consumption | Domestic Communication and Transportation Consumption | Domestic Education and Entertainment Consumption | Domestic Housing Consumption | Domestic Other Consumption |
|---|---|---|---|---|---|---|---|---|---|
| 1995 | 21877.90 | 189705.88 | 35434.66 | 39953.86 | 14617.90 | 14413.65 | 20783.44 | 26321.80 | 10730.92 |
| 1996 | 22215.55 | 214705.88 | 41473.05 | 45466.05 | 18600.91 | 17923.29 | 25886.03 | 33323.10 | 12967.76 |
| 1997 | 26938.35 | 221205.20 | 41776.18 | 48605.12 | 20894.83 | 20955.20 | 31639.61 | 39267.78 | 14513.64 |
| 1998 | 27023.10 | 223529.41 | 40861.89 | 52244.38 | 22294.00 | 24364.01 | 37028.88 | 45366.76 | 16046.66 |
| 1999 | 28666.30 | 225000.00 | 41527.95 | 54486.09 | 25166.18 | 28433.23 | 44688.12 | 50330.00 | 18706.81 |
| 2000 | 36647.43 | 232352.94 | 44928.69 | 62428.65 | 29965.40 | 37873.04 | 54127.55 | 58450.09 | 24133.16 |
| 2001 | 35825.51 | 239705.88 | 48670.89 | 65371.71 | 32514.02 | 43555.63 | 61348.35 | 62765.51 | 26507.33 |
| 2002 | 47881.76 | 260294.12 | 54776.27 | 64222.74 | 39703.62 | 55847.52 | 78309.01 | 68894.10 | 20566.52 |
| 2003 | 64445.26 | 282352.94 | 60380.17 | 67208.89 | 44822.90 | 66316.24 | 87173.27 | 78817.45 | 14855.06 |
| 2004 | 87253.76 | 327941.18 | 67008.26 | 69654.46 | 74546.68 | 43983.95 | 100459.74 | 84739.46 | 23852.02 |
| 2005 | 112051.97 | 360294.12 | 80568.03 | 78045.24 | 59462.36 | 106361.33 | 119672.51 | 82580.28 | 27857.04 |
| 2006 | 142490.53 | 388235.29 | 92299.14 | 93666.41 | 63974.64 | 125315.73 | 130481.56 | 94482.21 | 31729.27 |
| 2007 | 179411.76 | 435294.12 | 105600.65 | 64063.98 | 89705.98 | 143219.22 | 128999.54 | 133736.44 | 36086.23 |
| 2008 | 210294.12 | 547058.82 | 125816.26 | 80293.93 | 106707.85 | 158823.53 | 146660.75 | 172058.82 | 45284.81 |

Data source: National Bureau of Statistic of China, http://www.stats.gov.cn/tjsj/ndsj/

From table 2, we can find out that both domestic and foreign consumption are experiencing high speed growth as a result of China's high speed economic growth. We showed that domestic and foreign consumption can lead environment deteriorating. Following diagram illustrates the relationship between foreign consumption, domestic consumption and environment pollution. The diagram shows some correlation between foreign consumption, domestic consumption and environment deteriorating. In the following paragraph, we'll use econometric analysis to test such a correlation.

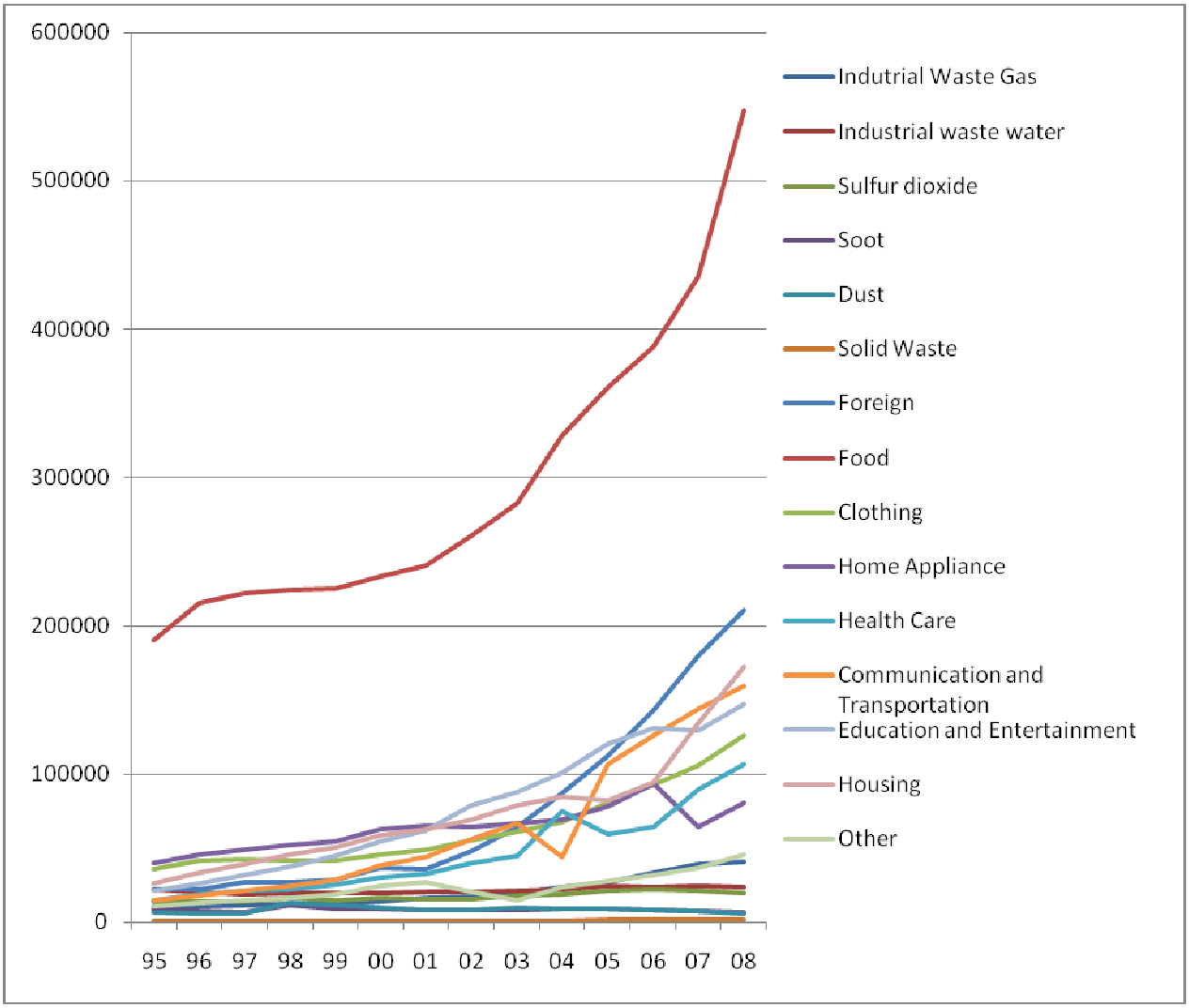


**Diagram 1 Foreign consumption, domestic consumption, and pollutants emission in China**

## 4.2 Econometric Analysis

Since the measurement unit of waste gas and other pollutants are different, researchers usually do studies on waste gas and other pollutant separately in existing literature. We follow this way, too. We run two regressions to investigate the relationship between foreign consumption, domestic consumption and environment pollution. We classify pollutants into two categories. The first category includes sulfur dioxide, industrial waste water, solid waste, soot and dust, which are all measured by weights. All the pollutants are aggregated by weights. Then we get a dependent variable which is the summation of sulfur dioxide, industrial waste water, solid waste, soot and dust. The second category is industrial waste gas, which is measured by volume. And this volume is another dependent variable which is used in our second regression.

Since consumption behavior, industrial structure, and culture are very different across provinces in China. To capture these effects, we use random-effect probit-regression model to estimate empirical equation (8). In the first regression, the dependent variable is the total weights of sulfur dioxide, industrial waste water, solid waste, soot and dust. The independent variable is foreign consumption and domestic consumption. Following table 3 gives the empirical study result.

**Table 3 Relationship between foreign consumption, domestic consumption and pollutants emission**

| Random-effect Regression | | Number of observations=432 | | |
|---|---|---|---|---|
| | | Number of observation groups=31 | | |
| R-Square=0.5832 | | | | |
| | | Wald Chi-Square=59.35<br>Degree of freedom=8 | | |
| Pollutants (by weights) | Coefficient | Stand error | t value | P>\|t\| |
| constant | 4.580933 | 0.5249572 | 8.73 | 0 |
| foreign consumption | 0.0675108 | 0.0420725 | 1.6 | 0.109 |
| Domestic food consumption | -0.3703553 | 0.1853254 | -2 | 0.046 |
| Domestic clothing consumption | 0.4758797 | 0.1601432 | 2.97 | 0.003 |
| Domestic housing consumption | -0.1170328 | 0.0770577 | -1.52 | 0.129 |
| Domestic communication and transportation consumption | -0.2463951 | 0.0570287 | -4.32 | 0 |
| Domestic home appliance consumption | 0.3167585 | 0.0827083 | 3.83 | 0 |

| | | | | |
|---|---|---|---|---|
| Domestic healthcare consumption | 0.2178789 | 0.0647222 | 3.37 | 0.001 |
| Domestic other consumption | -0.0801855 | 0.063412 | -1.26 | 0.206 |

The empirical results in table 3 show that there's a strong relationship between foreign consumption, domestic consumption and environment deteriorating. This is consistent with our theoretical results in section 3. We'll interpret the results in table 3 in detail. First, the positive and significant constant (4.58) means the production technology in China is relatively low. The production process highly depends on pollution-intensive inputs. At the same time, this also can be interpreted as relatively low price of pollution-intensive inputs. That is the government's tax on pollution is very low. To reduce the pollutants emission, government needs to increase the tax of pollution and encourage the use of pollution-free inputs.

Second, the foreign consumption's coefficient is positive and significant (0.068). This means that the foreign consumption is un-sustainable for China's environment. This result support Copeland and Taylor's (1995, 2004) perspective. The consumption needs from foreign markets is one main reason for China's environment deteriorating.

Third, domestic consumption, especially clothing, home appliance, and healthcare consumption are un-sustainable for China's environment (The coefficient of these three consumption expenditures are 0.476, 0.317, and 0.218 respectively). This result tells us that the un-sustainable domestic consumption do cause the environment deteriorating in China. The government should give more guidance on consumers' goods choice in order to reduce the pollutants emission. The coefficient on domestic food and communication and transportation are negative. This means that the food and communication and transportation consumption are not the main reason of China's environment pollution. Or, at least, the consumption of these goods doesn't increase the pollutants emission, such as sulfur dioxide, waste water and solid waste, etc. And finally, the coefficient on housing and other consumption are insignificant.

Now we'll run a test to estimate the relationship between foreign consumption, domestic consumption and waste gas. Following table 4 shows the result.

**Table 4 Relationship between foreign consumption, domestic consumption and waste gas emission**

| | |
|---|---|
| Random-effect Regression | Number of observations=432 |
| | Number of observation groups=31 |

| R-Square=0.7086 | | | | |
|---|---|---|---|---|
| | | Wald Chi-Square=1921.09<br>Degree of freedom=8 | | |
| Indutrial waste gas | Coefficient | Stand error | t value | P>\|t\| |
| constant | -0.52034 | 0.417852 | -1.25 | 0.213 |
| foreign consumption | 0.200307 | 0.031726 | 6.31 | 0 |
| Domestic food consumption | 0.016239 | 0.141123 | 0.12 | 0.908 |
| Domestic clothing consumption | 0.300418 | 0.120004 | 2.5 | 0.012 |
| Domestic housing consumption | -0.14873 | 0.055717 | -2.67 | 0.008 |
| Domestic communication and transportation consumption | 0.078178 | 0.041786 | 1.87 | 0.061 |
| Domestic home appliance consumption | -0.00195 | 0.061896 | -0.03 | 0.975 |
| Domestic healthcare consumption | 0.383451 | 0.046698 | 8.21 | 0 |
| Domestic other consumption | -0.11957 | 0.045764 | -2.61 | 0.009 |

Table 4 shows that coefficients on foreign consumption, domestic clothing consumption, and domestic healthcare consumption are 0.200, 0.300, and 0.383 respectively. This result again illustrates the relationship between foreign consumption, domestic consumption and environment pollution. And, the positive and significant coefficients mean that foreign consumption, domestic clothing and healthcare consumption increase the emission of waste gas. Combine the results in table 3, we find out foreign consumption, domestic clothing and healthcare consumption are un-sustainable to China's environment. Domestic communication and transportation consumption are positively related to waste gas emission. From table 4 we

can also find out that domestic housing and other consumption are not the main reasons of waste gas emission. The coefficients on food and home appliance are not significant.

## 5 Conclusion

Using economic modeling method, this paper theoretically illustrates the relationship between foreign consumption, domestic consumption and environment deteriorating. After the empirical data of China's consumption, exporting and pollution emission, the paper finds evidences that support the theoretical prediction: there's significant relationship between foreign consumption, domestic consumption and environment deteriorating. That is, if consumption is more sustainable, there will be less pollution. Second, in China, the consumption on clothing and home appliance and healthcare are the main reasons of environment deteriorating, in other words, Chinese consumers' consumption on home appliances and clothing is un-sustainable. Third, foreign consumption can cause environment deteriorating in China. Foreign consumption is also un-sustainable for China's environment, since foreign consumers' needs cause the transfer of production of high-pollution goods to China.

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