

*Full Length Research Paper*

# The preferential trade agreements in U. S. green tea trade

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**The purposes of this paper are to assess U.S. preferential trade agreements (PTAs) effects especially to 1) analyze the impact of North American Free Trade Agreement (NAFTA) in U.S. green tea trade, and 2) analyze the impact of the Generalized System of Preferences (GSP) program for green tea trade to U.S. The author propose to apply the gravity equation for U.S. green tea imports by focusing PTAs effects. The period from 1989 to 2010 was examined. The gravity equation estimates have revealed that NAFTA has a positive effect on the trade flows. The GSP has a positive impact when model includes zero trade values.**

**Key words:** Preferential trade agreements, gravity equation, North American Free Trade Agreement (NAFTA), generalized system of preferences.

## INTRODUCTION

Tea is the most widely consumed beverage aside from water (Graham, 1992). Especially green tea, black tea and oolong tea are the most consumed teas in the world and these are all derived from the same dried leaves of the plant. Focusing on its health benefits, green tea is the best of tea (Tachibana, 2011). During early and mid 1990's, a few big incidents happened for the green tea trade in the world. First, there are many medical and government reports about the green tea's positive effects for human's health such as reducing risk of stomach cancers and obesity during the 1990's (Lipton Institute of Tea, 2009). Tachibana (2011) mentioned that two decades ago it emerged green tea polyphenols were an important dietary factor for health promotion. Green tea phytochemicals have "anti-cancer properties and represent a promising therapeutic approach for the prevention and treatment of many cancers" (Tachibana, 2011). Another effect is that reduced stress by drinking green tea and avoiding addiction to coffee (Graham, 1992).

Green tea was consumed primarily in China, Japan, and a few countries in North Africa and the Middle East before the 1990s. Green tea consumption, however, in the U.S. has been increasing since 1990 and the trade

values of green tea imports to the U.S. in 2010 is more than eleven times the value from 1990 (Figure 1) while black tea imports in the U.S. have increased only 1.5 times since 1990 (Figure 2).

The third big incident is that there were some preferential trade agreements (PTAs) including free trade agreements (FTAs) in the early 1990's. General Agreement on Tariffs and Trade Uruguay Round (GATT-UR) was from 1986 to 1993. In this round, GATT included important new areas such as services, capital, intellectual property, textiles, and agriculture. After the GATT-UR, GATT became the World Trade Organization (WTO) in 1995 and also the U.S. made a free trade agreement in North America called the North American Free Trade Agreement (NAFTA) in 1994.

In the U.S., present tariff rates are categorized by three classes: general rates, special rates, and Column 2 rates. Countries which have normal trade relationships with the U.S. have general rates. Countries which have special programs with the U.S. have special rates. Column 2 rates apply to goods which are not eligible for either normal trade relations or special rates. In the case of green tea, there are different duty rates for each category. General rate category has 6.4% and Column 2 rate category has 20%, while special rate category is free (Dotti, 2011).

Figure 3 shows that thirty one green tea export countries to U.S. from 1989 to 2010. China (here only the

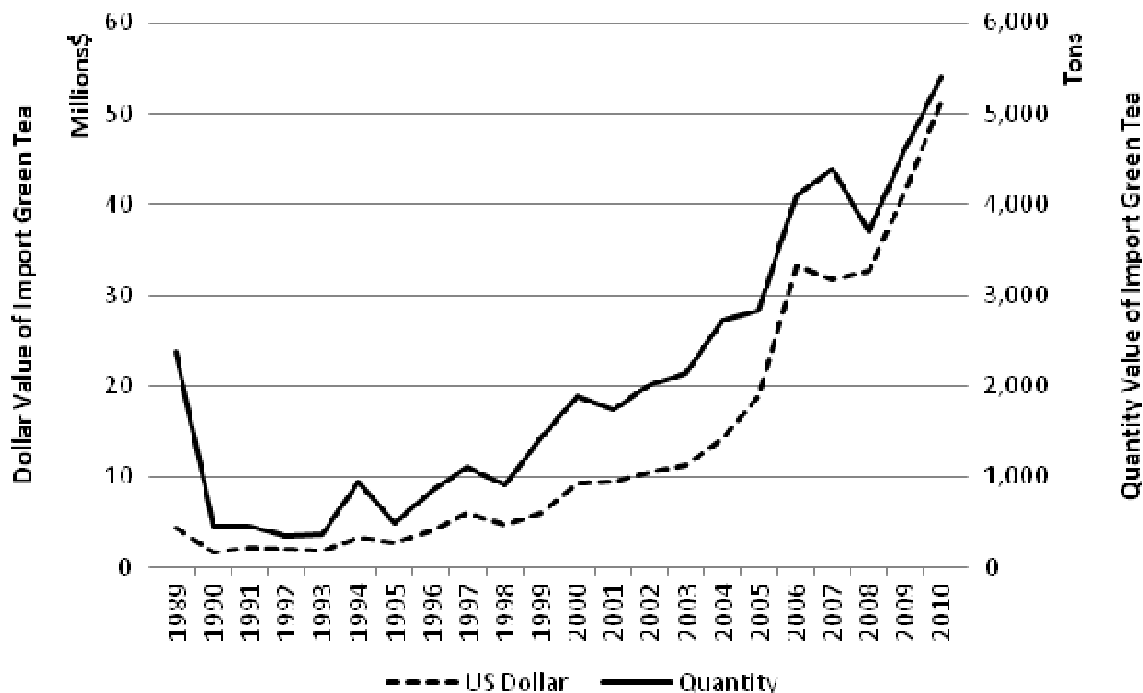


Figure 1. Total green tea trade values in the U.S. from 1989 to 2010. Source: USITC <http://www.usitc.gov/>.

data of China Mainland for the convenience of depiction were considered) was the leading green tea exports to U.S. from 2002 to 2007 and Japan has been the largest green tea exporter to U.S. since 2007. Also there have increased many Canadian wholesalers treated green tea exports to U.S. This action indicates to get biggest advantage from NAFTA, reduction of tariffs. Burfisher (2001) reported that there are several empirical NAFTA studies using surveys (U.S. Department of Labor, 1993; U.S. International Trade Commission, 1992). These surveys concluded that the effects of NAFTA would be positive but small for the U.S. economy, and positive and large for Mexico.

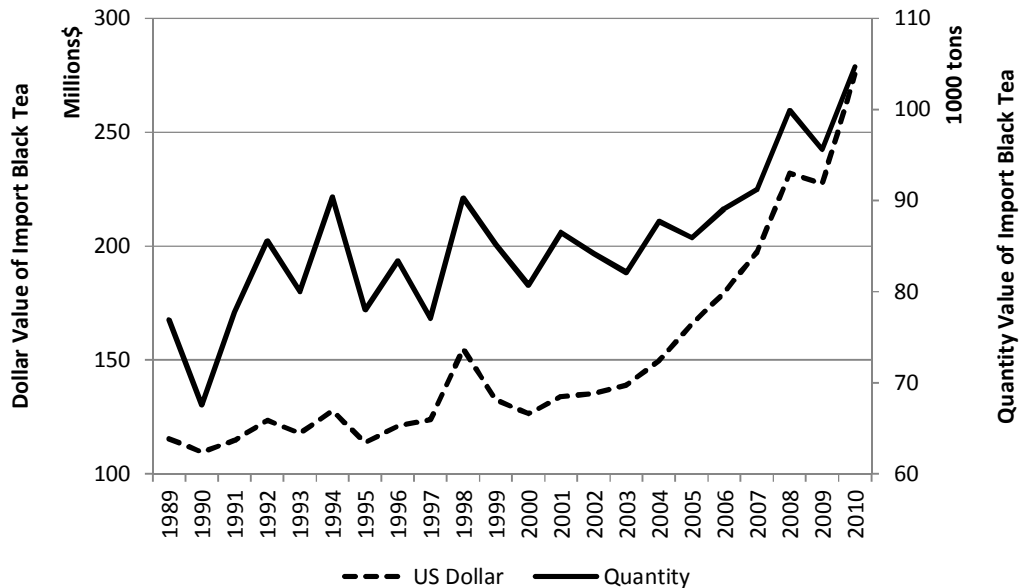
Following these PTAs, some economically small and developing countries made PTAs with developed large countries as the Generalized System of Preferences (GSP) for agriculture to take many advantages such as reduction of tariff and other trade liberalization policies of international trade. The GSP is "a formal system of exemption from the more general rules of the WTO." Specifically, it's a system of exemption from the most favored nation principle that obligates WTO member countries to treat the imports of all other WTO member countries no worse than they treat the importers of their 'most favored' trading partner (WTO/GATT)." In the U.S., Oustr defines and reports that "the U.S. Generalized System of Preferences, a program designed to promote economic growth in the developing world, provides preferential duty-free treatment for over 3,400 products from 131 designated beneficiary countries and territories, including 44 least-developed beneficiary developing

countries" (Oustr). The GSP program started from 1976, and authorized under the Trade Act of 1974. There are twenty-four designated beneficiary countries<sup>1</sup> have used GSP as U.S. import program for green tea trade excluding GSP only for least-developed beneficiary countries (LDBC) but there is no GSP program for coffee and black tea trade in U.S. between 1997 and 2010 (USITC data). The GSP expired in 2010. Thus most exporting countries have to pay duties for exports while some countries has kept duty-free under the Africa Growth and Opportunity Act (AGOA) program from 2011(USITC).

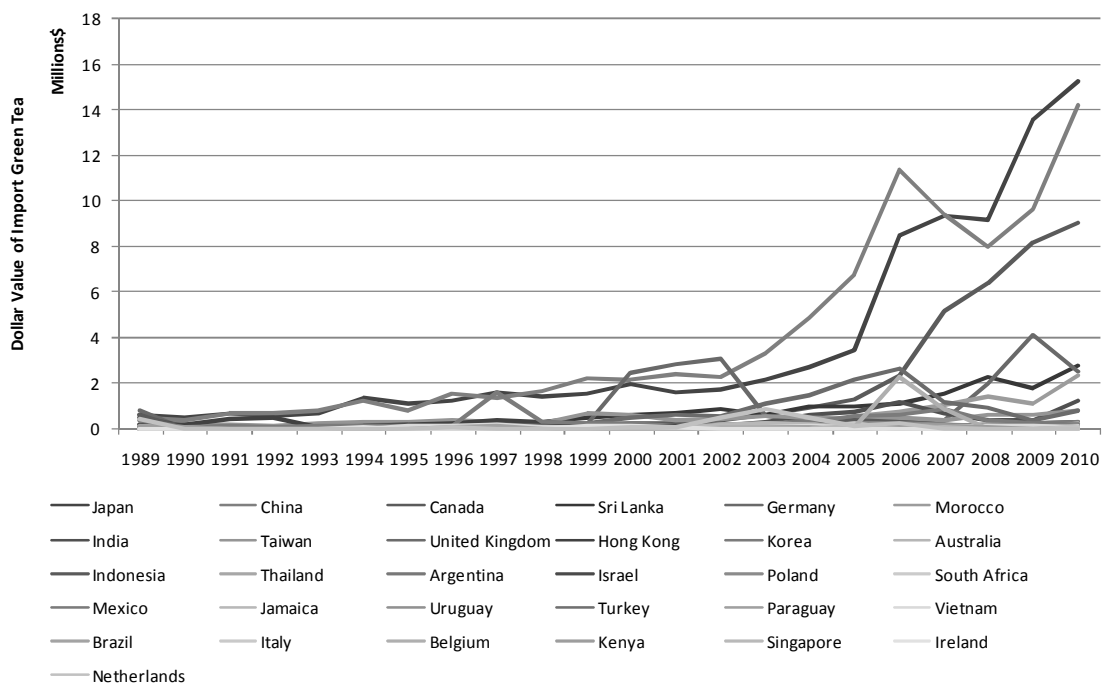
There are many researches about NAFTA effects but a few studies assessing U.S. PTAs including both NAFTA and GSP after U.S. phased out the GPS for agriculture in 2010. Therefore, quantitative analysis of the potential effects of PTAs made a major contribution not only to U.S. green tea trade policy debate but also to assess the U.S. GSP for agriculture.

The objectives of this paper are to assess U.S. PTAs effects especially 1) analyze the impact of NAFTA in U.S. green tea trade, and 2) analyze the effect of the GSP program for green tea trade to U.S. The author propose to apply the gravity equation for U.S. green tea imports by focusing PTAs effects. The author examine the period from 1989 to 2010.

<sup>1</sup> The twenty-four countries are Argentina, Bosnia-Herzegovina, Brazil, Chili, Colombia, Croatia, Hungary, India, Indonesia, Jamaica, Kenya, Latvia, Morocco, Nepal, Pakistan, Peru, Poland, Russia, Serbia/Montenegro, South Africa, Sri Lanka, Thailand, Turkey and Uruguay.



**Figure 2.** Total black tea trade values in the U.S. from 1989 to 2010. Source: USITC <http://www.usitc.gov/>.



**Figure 3.** Top 20 green tea export countries to U.S. from 1989 to 2010. Source: USITC <http://www.usitc.gov/>.

**METHODOLOGY**

In this paper, the impacts of PTAs (NAFTA and the GSP for agriculture) and other components (that is, costs of transportation, common language, colonial experience and bilateral exchange rate volatility) on international green tea trade in the U.S. were determined. Koo and Karemera (1991) and Koo et al. (1994) derived the single commodity gravity model based on Bergstrand (1985, 1989) and applied empirical application using panel data

instead of cross-sectional data in determining trade flows and policy analysis of wheat using the gravity model. McCallum (1995) focused on boarder effects between Canada and U.S. and Helliwell (1996, 1998) and McCallum (2003) apply boarder effects inhibiting trade. Rose (2000), Frankel and Rose (2002) and Glick and Rose (2002) studied impacts of currency arrangements on bilateral trade. Amponsah (2005) determine the impacts of policies originating by trade agreements in 2004 using reduced form gravity model. Hayakawa and Yamashita (2011) discussed that one of the

**Table 1.** Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
$\ln(X)$	356	9.477225	2.1634	0.6931472	14.75513
$\ln(X+1)$	682	6.855385	4.624807	0	14.75513
$\ln(GDP_i)$	682	5.296374	1.690294	1.34025	8.679015
$\ln(GDP_{US})$	682	9.14392	0.3175799	8.609248	9.592728
$\ln(\text{Distance})$	682	8.985541	0.6613047	6.306996	9.691551
<i>GSP</i>	682	0.4516129	0.4980184	0	1
<i>NAFTA</i>	682	0.0645161	0.2458504	0	1
<i>Language</i>	682	0.3870968	0.4874436	0	1
<i>Colony</i>	682	0.0645161	0.2458504	0	1
<i>Volatility</i>	682	0.0226169	0.0282081	0	0.438344

desirable advantages of the gravity model is to fit the data very well especially the variation of the bilateral trade flows in R-squares ranges of 65 to 95%. These high explanatory powers led to apply the gravity model in many researches (Hayakawa and Yamashita, 2011).

Hayakawa and Yamashita (2011) mentioned that the bilateral trade flows are positively related to the size of markets which is commonly measured by GDP, and negatively related to the two countries' geographical distance in the gravity model because generally, an importer prefers to pay less shipping costs, so that he/she will choose to import products from closer distance country than a further country if and only if other things such as quality of goods are equal. The basic empirical gravity equation is as:

$$(1) \ln X_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln Dist_{ij} + \varepsilon_{ij}$$

where  $GDP_{it}$  is the gross domestic product of exporting country  $i$ ,  $Dist_{ij}$  is the distance in kilometers between exporting country  $i$  and importing country  $j$ . In this paper, the focus was on U.S. green tea import market and  $j=U.S.$   $\varepsilon_{it}$  is the error term. Most previous empirical researches extended Equation (1) with the explanatory variables. There are major PTAs which are the GSP and NAFTA to affect international green tea trade in U.S. In this paper, PTAs are most important dummy variables and *GSP* is the dummy variable identifying the GSP for agriculture to the U.S. that taking unity if countries have the GSP to the U.S. for green tea trade and zero otherwise. *NAFTA* is the dummy variable identifying the membership of NAFTA that taking unity if countries are members of NAFTA and zero otherwise. Also *NAFTA* dummy covers border effects that two countries share the national border. *Lang* is the dummy variable that taking unity if the country using English commonly and zero otherwise. *Col* is the dummy variable identifying colonial experience that taking unity if there was once a special relationship between a suzerain and colonies and zero otherwise. For example, the United Kingdom (U.K.) has still strong trading relationships and special trade routes to former colonies which are Canada, Australia, New Zealand and India. *Vol* is variable identifying bilateral exchange rate volatility between country  $i$  and U.S. Hayakawa and Yamashita (2011) argued that risks and uncertainly are created by the volatility of nominal exchange rates in international trade transactions and volatile exchange rates will reduce the trade levels. Following Rose (2000), the real exchange rate volatility was used, which "is a widely used indicator and is constructed as the standard deviation of the first-difference of the monthly natural logarithm of bilateral real exchange rates in the preceding five-year period (Rose, 2000)."

The applied empirical reduced form gravity model to access the impact of policies on the U.S. imports of green tea is specified as:

$$(2) \ln X_{iust} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{ust} + \beta_3 \ln Dist_{iust} + \beta_4 GSP_{iust} + \beta_5 NAF_{it} + \beta_6 Lang_{iust} + \beta_7 Col_{iust} + \beta_8 Vol_{iust} + \varepsilon_{iust}$$

where script  $t$  denotes time (year). The variables and summary statistics are presented in Table 1.

### Data resource and specifications

To evaluate the green tea trade in the U.S., the empirical reduced form gravity model was applied. Equation (2) is based on secondary data obtained from the following sources. Trade values of green tea and black tea were obtained from the United States International Trade Commissions (USITC) trade data. Available recent data of green tea and black tea trade values is years from 1989 to 2010. GDPs were obtained from the World Economic Outlook on April 2011 by International Monetary Fund. Distance, Language and Colony between an exporting country and the U.S. were obtained from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII: <http://www.cepii.fr/anglaisgraph/news/accueilengl.htm>) which is the main independent French institute for research into international economics. Additionally, annual dummies are used to capture international trade policy effects for both GSP and NAFTA memberships by each country and to capture smooth trade relationship by English for language. Exchange rates were obtained from U.S. Department of Agriculture-Economic Research Services, Agricultural Exchange Rate Data Set (<http://www.ers.usda.gov/Data/ExchangeRates/>).

The thirty-one exporting countries of green tea to the U.S. included in this paper are Argentina, Australia, Belgium, Brazil, Canada, China, Germany, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Kenya, Mexico, Morocco, Netherlands, Paraguay, Poland, Singapore, South Africa, South Korea, Sri Lanka, Taiwan, Thailand, Turkey, U.K., Uruguay and Vietnam.

### Panel unit-root tests

Before estimating Equation (1), this research analyzes the univariate characteristics of the data that entails panel unit root tests. Panel unit root test determines a potentially cointegrated relationship between the variables. If all variables are stationary, then the traditional estimation methods can be used to estimate the relationship between the variables. If the variables are nonstationary a test for cointegration is required (Eita, 2008; Sichei, 2005). There are several different types of panel unit root tests. Hadri (2000) and Levin, Lin and Chu (2002) applied a panel unit root test that panel unit roots assumes that the autoregressive parameters are common across countries. Hadri (2000) used a null hypothesis of no unit root while Levin, Lin and Chu (2002) used a

**Table 2.** Summary of panel unit root tests.

Variable	LLC test statistic	Hadri LM test
	Null: Unit root	Null: No unit root
X	1.535	51.433***
	0.598	0.000
GDP <sub>i</sub>	9.603	53.137***
	0.295	0.000
GDP <sub>US</sub>	2.327	72.455***
	0.310	0.000

\*\*\*, \*\*, and \* indicate 1, 5, and 10% significance, respectively.

null hypothesis of a unit root.

This study uses the Hadri and LLC methods for checking the univariate characteristics of the data and these test results are presented in Table 2. The LLC test results show that all variables are non-stationary. The Hadri test results indicate that all variables are stationary. This study uses a rejection of unit root by at least one test that assumes a verdict of stationarity. This implies that cointegration test is not required and ordinary least squares method can be used to estimate Equation (1).

## RESULTS

For estimating the empirical reduced form gravity model, a STATA estimation program (STATA IC 11) was used. Amponsah (2005) discusses that one of the advantages in using panel data for estimating the gravity model is that there is the ability to control for the presence of individual variable effects which are common to the individual country across time, but which may vary across countries at any one-time period.

### Zero trade values

Approximately half of observations of more than ten countries were zero trade values. Melitz (2003) comments that trade flows can be systematically zero rather than pure misreporting. Melitz (2003) and Helpman et al. (2008) discussed that “*only highly productive firms can afford to bear the fixed costs of exporting* (Hayakawa and Yamashita, 2011).” This paper follows that Hayakawa and Yamashita (2011) approach applied simple method to concern zero trade values<sup>2</sup>. This study follows Hayakawa and Yamashita’s (2011) approach that repeats estimations adding a value of one to dependent variables before taking logarithms transformation. This is a suitable approach for considering zero trade values in gravity equation analysis (Hayakawa and Yamashita, 2011).

<sup>2</sup> See Hayakawa and Yamashita (2011) more detail discussions.

Table 3 shows the estimated results of the effects of PTAs on green tea trade in U.S. Regression 1 and 2 in Table 3 shows gravity equation estimations and regression 3 and 4 repeats the same estimations adding a value of one in dependent variables,  $X+1$ , before taking logarithm. The estimate coefficients for the PTAs dummies do not change the model with/without colony dummy that much, and NAFTA dummy does not change by taking into account zero trade flows, while the GSP dummy switches a sign of estimate coefficient after including zero trade values. Therefore, discussions below are two parts that the results include and exclude zero trade values.

### Excludes zero trade values

The GDP of the U.S., distance between an exporting country and the U.S., and the dummy variable of NAFTA are statistically significant at the 99% confidence level, the dummy variables of the GSP and Language are statistically significant at the 95% confidence level, and the GDP of exporting country is statistically significant at the 90% confidence level both in regression 1 and 2. The dummy variable of Colony is statistically significant at the 90% confidence level in regression 1. Real exchange rate volatility is statistically significant at the 90% and 95% confidence level in regression 1 and 2, respectively.

The GDP of green tea exporting country to the U.S. is positive sign which indicates that an increase in the GDP of exporting country will increase around by 60% in a level of green tea imports to the U.S. We expected that the distance and the green tea trade value have the negative relationship because of reducing shipping costs from the exporting country. The estimated coefficient for the distance has the positive sign which indicates that an increase distance between exporting country and the U.S. will increase the trade value of green tea in the U.S. This result follows the real U.S. green tea trade that most green tea exporting counties in the top 15 green tea trade to U.S. are East, Southeast and South Asian countries.

**Table 3.** The effects of PTAs on green tea trade in U.S.

Variable	(1)	(2)	(3)	(4)
	Model log (X)	Model without colony	Model log(X+1)	Model without colony
Intercept	-94.893***(24.927)	-81.574***(21.345)	-125.528***(42.003)	-68.849***(7.494)
GDP <sub>i</sub>	0.628*(0.344)	0.619*(0.338)	2.039***(0.466)	0.823***(0.331)
GDP <sub>US</sub>	3.469***(0.499)	3.457***(0.493)	1.590***(0.720)	4.311***(0.571)
Distance	8.504***(2.681)	7.063***(2.304)	11.912***(4.621)	5.273***(0.699)
GSP	-2.529***(1.151)	-2.260***(1.102)	3.107*(1.810)	0.905***(0.590)
NAFTA	26.811***(8.259)	21.426***(6.832)	36.143***(15.276)	17.631****(2.280)
Language	-2.423***(1.208)	-2.387***(1.088)	-5.111*(2.835)	-5.576****(0.934)
Colony	4.692***(2.214)		16.038*(8.536)	
Volatility	0.169*(0.089)	0.176**[0.088]	0.396****(0.124)	0.344****(0.136)
R <sup>2</sup>	0.54	0.5	0.45	0.59
N	356	356	682	682

Standard errors are in parentheses. \*\*\*, \*\*, and \* indicate 1, 5, and 10% significance, respectively.

The negative sign on the GSP dummy variable shows the negative relationship between the GSP country and the U.S. This indicates that the GSP countries may have decreased their access to the U.S. market when an increase more the GSP countries. Thus, the GSP countries will not take benefits of reduction tariff and other trade liberalization policy in the U.S. green tea trade when the estimation does not concern zero trade values. This is a unique estimated result that was not expected since a positive relationship between the GSP and U.S. was expected. However, this result may make sense when the U.S. importers consider more other components such as green tea quality (that is, organic green tea leaves or less chemical sprayed leaves) because most exporting countries including zero trade values are small exporters and do not produce high quality green tea (Lipton Institute of Tea, 2009).

The positive sign on the NAFTA dummy variable indicates that there is positive relationship between Canada, Mexico and U.S. Therefore, Canada and Mexico will take advantage of the reduction of tariff a lot for green tea trade to the U.S. This result supports there have increased many Canadian wholesalers treated green tea exports to U.S. using NAFTA.

However, the language dummy variable is a negative. This indicates that country mother language is not important for green tea trade to U.S. as distance. The colony dummy variable is a positive. This is consistent result with Hayakawa and Yamashita (2011) but it is not important variable for U.S. green tea trade because estimation results with and without colony dummy have similar results in both models.

### Includes zero trade values

Following Hayakawa and Yamashita's (2011) approach for including zero trade values, estimated variables of

distance between an exporting country and the U.S., the dummy variable of NAFTA and real exchange rate volatility are statistically significant at the 99% confidence level both in regression 3 and 4. The GDP of exporting country is statistically significant at the 99 and 95% confidence level, the dummy variable of the GSP is statistically significant at the 90 and 95% confidence level, the dummy variable of Language is statistically significant at the 90 and 99% confidence level in regression 3 and 4, respectively. The dummy variable of Colony is statistically significant at the 90% confidence level in regression 3.

The difference in estimation results from excluding zero trade values is that the GSP dummy has a positive sign. Thus there is a positive relationship between the GSP countries and the U.S. This indicates that the GSP countries may have increased their access to the U.S. green tea market when an increase more the GSP countries. Therefore, the GSP countries will take benefits of reduction tariff and other trade liberalization policy in the U.S. green tea trade when the estimation includes zero trade values. This is consistent with Ataman and Beghin (2005) results that U.S. GSP strongly supports low-income country trade opportunities to the U.S.

### Conclusions

In the past decade, the U.S. has increased green tea consumption and most of the U.S. tea market analysis considered tea as black and green teas together. Some papers studied black tea but few literature works about green tea in the U.S. Also there is no study focuses on PTAs especially the GSP for agriculture effects which expired in 2010. In this paper, the author focus on this niche market for understanding how international trade liberalization policies affect on the green tea trade in the U.S.

A gravity equation to study green tea import markets in the U.S. was used. The paper has revealed that NAFTA has a positive effect on the trade flows. The GSP has a positive impact when the model includes zero trade values. It was found that the GSP for agriculture is a beneficial program for small green tea trade value countries which are also developing countries. This is consistent with previous GSP study (Ataman and Beghin, 2005). Distance and language between exporting country and the U.S. are less important in green tea trade. NAFTA which is another PTAs is also important for green tea trade to U.S. Given these results, there is no doubt that implementing NAFTA works greatly for green tea trade. Also the U.S. GSP for agriculture worked well especially for small green tea trade exporting countries although the U.S. GSP expired in 2010.

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