The Effects of the Transatlantic Trade and Investment Partnership (TTIP) on the Cheese Trade between the EU and the US

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Authorization to Submit Thesis

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Abstract

The EU and the US have been negotiating a Transatlantic Trade and Investment Partnership (TTIP) agreement to create a more comprehensive and deeper trade relationship between them. This thesis estimates the effects of the TTIP on the cheese trade between the US and the EU in two scenarios: the EU's geographical indications (GIs) protection system is relaxed or not. The sensitive analysis of tariffs reduction conducted in both scenarios.

A country-fixed effects added gravity model with "GIs bloc" dummies is estimated by Poisson Pseudo Maximum Likelihood method. Results show that in the short term, when the GIs protection is relaxed, both the US's cheese exports to the EU and the EU's cheese exports to the US will increase with different level's tariffs reduction. When the GIs protection is preserved, the US's cheese exports to the EU will increase. However, the EU's cheese exports to the US will decrease.

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Table of Contents

List of Tables

Chapter1 Introduction and Literature Review

1.1 Background

1.1.1 Transatlantic Trade and Investment Partnership (TTIP)

As major economies in the world, the United States (US) and the European Union (EU) together account for 47.43% share of the world gross domestic product (GDP) in 2016. Their bilateral trade relationship is also the largest in the world (Eurostat, 2015). In 2015, the US is the EU's largest exporting market. The US is also the second largest trade partner for the EU in terms of imports. For the US, the EU is the second largest importing source and the second largest exporting partner as well. To deepen their trade and partnership to a higher level, the Transatlantic Trade and Investment Partnership (TTIP) was launched in June 2013, and it is expected to be signed in 2017. The EU-US trade represents about one-third of the world's trade (World Bank – COMTRADE, 2015), so the economic relationship between EU and the US has the significant impact in the world. The TTIP between the two partner countries aims to build the largest Free Trade Area in the world and to influence other trading relationships (Fontagne et al., 2013; EU commission, 2014)

TTIP seeks a comprehensive free trade agreement between the US and the EU from three aspects: market access, regulatory cooperation, and rules (EU Commission, 2015). By eliminating tariffs and reducing other non-tariff barriers (NTBs), this agreement is expected to create more than 13 million jobs in the partner countries and help to grow the world economy (United States Trade Representative, 2015).

1.1.2 Cheese Industry

Cheese is important for the US dairy industry now because when the domestic fluid milk consumption per capita has tumbles since 2003 every year, the domestic consumption for cheese have increased for 7 years. However, the US milk production has kept increasing since 2003, and the production in 2015 increased 22.47% compared to 2003 (USDA, 2016). The US Department of Agriculture (USDA) have employed several tools to help the US dairy farmers in the downturn market: $11.2 million on the Dairy Margin Protection Program,

Agriculture Risk Coverage and Price Loss Coverage. To reduce a private cheese surplus, the USDA announced to purchase $20 million of cheddar cheese in Oct.11, 2016. (USDA, 2016) Also, they established the Dairy Product Donation Program which is effective when the margin is low for dairy operation.

When the domestic consumption is weak, the growth of the dairy sector relies largely on the trade, and the free trade agreement (FTA) plays an important role in trade. In 2015, the exports from the US dairy sector to its FTA partners increased from $690 million to $2.8 billion (USDA,2016). The Trans-Pacific Partnership (TPP) is estimated to "create an additional $150 to $300 million in annual US exports" by the Chief Economist in the USDA's Office. In Jan 23, 2017, the US has abandoned the TPP, so the Transatlantic Trade and Investment Partnership (TTIP) deserves more attention now.

Cheese is one of the largest agricultural products traded between the US and EU, but the EU gains more in the cheese trade with the US now. In 2014, the US market represent 17.4% of the EU total exports values and 5.2% of EU cheese exports value. The EU market account for 17% of the US total exports, but only represent 1.75% the US cheese exports value. (World Bank – COMTRADE, 2015) The unequal cheese trade between result partly from the unequal cheese ad valorem tariffs (import tax per unit) applied between the US and EU: In 2014, for cheese product, the EU applied 36.39% Tariffs on the EU, which is more than three times higher than the US tariffs (11.62%) (World Bank – TRAINS, 2015). Given this tariff structure, the tariffs reduction policy is supposed to has more substantial impact on the US cheese exports than that of the EU.

1.2 Ad Valorem Tariff

Ad Valorem Tariff is the custom duty that is calculated as a percentage of the value of the importing products. One goal of the TTIP is to remove trade barriers on the goods traded between EU and the US As the main barriers on trade, the tariffs are expected to decrease for both EU and the US cheese imports.

Even though the specific policy is still uncertain, the TTIP is expected to have a huge impact on the cheese trade between the US, and the EU in terms of the tariffs decrease. Since the EU tariffs is higher than the US tariffs on cheese imports, the tariff decrease should have more positive effects on the US exports than the EU. However, compared to other partners, the tariffs between the EU and US are already not high: EU's applied tariffs on the US's cheese is 36.39% and the US's applied tariffs on the EU's cheese is 11.62% (TRAINS, 2016). In comparison, the EU's tariff on Norway and Canada are 277%, 245.5%, respectively. Compared to the non-tariffs barriers reduction, the tariffs decrease between the EU and the US has less benefits.

1.3 Geographical Indications (GIs)

In addition to the tariffs decrease, the geographic indications (GIs) certification is another important issue in TTIP negotiation related to cheese trade.

The World Trade Organization (WTO) defined Geographical indications（GIs）in 1995 Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) as "indications which identify a good as originating in the territory of a Member, or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographic origin."

The EU and the US have different systems to protect GIs. As an important quality policy in the EU, the Protected Geographical Indication (PGI), the Protected Designation of Origin (PDO), and Traditional Speciality Guaranteed (TSG) are used to restrict the labeling of products that are not produced in the traditionally recognized geographical origin in the EU. Differently, the US uses the trademarks to protect the name of origin. Compared to trademarks, the EU's GIs system has higher protection standard. First, not only the GIs names are prohibited to be used by others than GIs holders, the GIs names with expression such as "kind", "type", "style" etc. cannot be used as well. Second, the EU's protection is enforced by the administrator, but the protection in the US is initialed by judicial means. If the EU's GIs certification is conducted in the US market, i.e., the EU's GIs protection is

preserved, non-EU producer can no longer use the cheese name such as Feta, Gouda, and Parmesan for similar cheese products. The GIs certification as a non-tariff barrier may have even larger effects on trade than tariffs since the tariffs between them is already not high. The US protect through the trademark system since 1946 and the system is self-policing. The EU has a separate GIs protection system and stronger protection standards than the TRIPS and the US Different standards in the US and the EU come from different goals of protections. The US protects it for commercial value, but the EU intends to protect their traditional food and life in addition to economic benefits.

One critical difference between the EU and the US protection related to the cheese trade is whether some generic cheese name should be protected in the TTIP. They have different standards to identify whether the name is generic. Some generic name used in the US is designated as the category of the cheese rather than names that contain the information on the authenticity of the cheese in the EU market. Thus, EU producers lose the advantage to use these GIs to differentiate their cheese in the US market now. Since EU producers obtain many famous GIs cheese name, such as feta, mozzarella etc.

As the regulation divergence between the US and the EU, GIs protection differences increase the trade cost for both. EU has stronger protection, so the US companies who intend to access the EU market face more barriers. The high GIs protection also enable the EU to differentiate products according cultural and traditional characteristics, advantages in both the domestic and the foreign market. As a result, the EU has a firm attitude to preserve their GIs protection list in the TTIP.

To build a more integrated market and to work together more closely, the EU and the US should cooperate their regulations and various rules, which can cut trade costs. (EU Commission, 2015).

The EU's strict GIs protection system is proposed by the EU as the rules to be used in the TTIP and the EU have several proposals to accomplish the GIs protection in the TTIP: one idea it to associate GIs protection standard with the "standards of identity" executed by the Food and Drug Administration. Another one is to follow the CETA, where the regulations are less restrictive but the list of GIs names are shorter, i.e., the GIs protection is relaxed in

partners' market. For example, The GIs protection has been addressed in the new trade agreement between the EU and the Canada (CETA), which is voted in favor by the European Parliament in Feb 15, 2017. In, CETA, asiago, feta, fontina, gorgonzola, and muenster can still be used only if they are appended with "expressions such as "kind", "type"," style", "imitation" or the like and is in combination with a legible and visible indication of the geographical origin of the product concerned". The GIs protection is also included into the bilateral trade agreement between the EU and Mexico in 2001. Both countries are in the North America Free Trade Agreement (NAFTA) with the US, so they share similar characteristics with the US. Thus, the EU has a firm attitude on the preservation of the GIs protection in the TTIP negotiations.

1.4 Research question and Literature Review

Our research question is what the TTIP will bring to the cheese trade between the EU and US, i.e., the trade potential of TTIP between the EU and the US in terms of cheese products. In the context of TTIP, two issues are associated with the cheese trade closely: Tariffs and EU's GIs system. Without the GIs certification issue, the tariffs decrease is expected to increase cheese exports for both the EU and the US. The impact of the GIs certification depends on peoples' reaction to it.

Many previous studies employ the computable general equilibrium (CGE) model to estimate the economic effects of the TTIP. In 2013, the EU released an economic assessment on the TTIP based on the Ecorys' study (Ecorys, 2009). They use the CGE model in two scenarios with different level of tariffs and NTBs reductions. They conclude that both the US and EU will gain from the TTIP, but the changes on the NTBs have more critical effects not only on the benefits for both parties but also to the "logic of transatlantic trade liberalization". In addition, if the rest of the world could converge to the new EU-US standards, the global NTBs could reduce as well, which could benefit more countries. They also include disaggregate level analysis, but the range is still rough. There are other studies using the CGE model on the agricultural sectors. Disdier et al. (2015) evaluate both the tariff

reduction and non-tariff barrier (NTB) harmonization under the TTIP with the Modeling International Relationships in Applied General Equilibrium CGE model. They find the TTIP agreement would provide more benefits to the US agri-food sectors than to their trading partners. The US agri-food exports will increase 159%, but the E.U. export will increase only 55.5% according to their conclusion. Studies on the whole agriculture sector with CGE framework (Francois et al., 2015; Beckman, 2015) have similar result for the aggregate economy, but they don't provide information for specific industry in the context of TTIP. These studies' objectives are too broad and the drawback is different commodities have different characteristics. For example, different commodities are related to different factor endowment of the countries. There are studies demonstrating the significance of the "commodity disaggregation" when it comes to the effects of free trade agreements (Fukao, Toshihiro and Robert, 2003).

Compared with previous studies, we focus on the cheese product since cheese takes up 20% among the GIs registered foodstuff in the Europe, and the US and the EU are significant players in the world cheese market (Matthews, 2015).

We employ the gravity model with cheese specific data instead of the CGE model. Compared to the CGE model, the gravity model doesn't require the bottom-up estimates of NTBs and enable the US to make analytical description in the TTIP scenario with data (Anderson et al., 2014). The NTBs analysis are prepared based on the Ecorys' study for their economic impact on the EU, which combines scale surveys with gravity model to get an ad-valorem tariff equivalents. Instead of measuring the NTBs, we obtain the trade pattern and characteristics among members engaging in those NTBs to measure the effects of those NTBs. The measurement error to get the tariffs equivalent of NTBs can be avoided in our model. Also, the gravity model needs fewer hypotheses related to economic systems. In terms of the uncertainty of the TTIP content, this is another advantage of the gravity model.

We collected panel data for 25 countries including the US and the EU. When the bilateral trade among those countries considered, total 23[1] countries who trade cheese with both

[1] The other 23 countries are Argentina, Australia, Bahrain, Brazil, Canada, China, Colombia, Egypt, Iceland, Israel, Japan, Jordan, Lebanon, Mexico, New Zealand, Norway, Russian Federation, Saudi Arabia, Switzerland, Turkey, Ukraine, United Arab Emirates, and Uruguay.

the EU and the US included in this study. The time period spans from 2000 to 2014. We use the country-fixed effects gravity model to incorporate the multilateral resistant terms (Anderson et al., 2013). Both the tariff decrease and GIs certification are considered in this paper. The zero value is a big issue with cheese exports data and the data is not normally distributed, so we use PPML rather than the OLS to get consistent estimator (Flowerdew et al., 1982; Silva and Tenreyro, 2006). The estimation is conducted in two samples to capture different trade patterns of different groups: first, the whole sample, i.e., the global world; second, the sample is restricted to the exporters that have the bilateral agreements on the GIs protection with EU, i.e., the GIs protection blocs. The global group can capture the determinants of the bilateral cheese trade globally and the effects of the TTIP in the short term. The latter one shows the effects of the TTIP in the long term.

The effects of the TTIP is estimated in two scenarios based on the estimated results from the whole sample model. The first scenario is the EU's strict GIs protection is adopted in the US market as well, i.e., the EU's GIs protection is preserved. The second scenario is not all the cheese name in the EU's GIs protection list are forbidden to be used in the US market, i.e., the EU's GIs protection is relaxed. In both scenarios, we conduct sensitive analysis with four different levels tariffs reduction since we are uncertain about the negotiation results.

The results show that in the first scenario, i.e., if the GIs certification is preserved, when the applied ad-valorem tariffs decrease 25%, 50%, 75%, 99%, the US's cheese exports to the EU will increase 44.37%, 45.89%, 48.44% and 56.69%, respectively; the EU's cheese exports from the EU to the US will decrease 63.31%, 62.96%, 62.4% and 61.11%, respectively.

In the second scenario, not all names in the EU's GIs protection lists are prohibited to be used in the US market, i.e., if the EU's GIs protection is relaxed, when the applied ad-valorem tariffs is reduced 25%, 50%, 75%, 99%, the US's cheese exports to the EU will increase 32.87%, 34.27%, 36.62% and 44.21%, respectively; the EU's cheese exports from the EU to the US will increase 2.65%, 3.65%, 5.22% and 8.83%, respectively. All these estimated results reflect the effects of the TTIP in the short term.

Consumers in the US are assumed to have different reaction to the GIs protection cheese products as consumers in the EU do. In the long run, the consumers in the US may change

their attitude to the GIs protection system, so do their demand for GIs protection cheese products. Thus, the effects of the TTIP need further study.

Chapter 2 Gravity Model

2.1 Gravity Model Theory

After introduced by Tinbergen (1962), the gravity model has become the workhorse tool in analyzing the foreign trade empirically. It has been applied on a variety of subjects, such as the migration, foreign direct investment, and the impact of the free trade agreements on the trade flow (Martínez et al., 2003; Kepaptsoglou et al., 2010).The atheoretical gravity model is analogous to Newton's law of gravitation: the bilateral trade is proportional to partners' economic size and inversely proportional to square of their proximity and the equation is:

$$x_{ij} = M_i M_j / d_{ij}^2$$

Where the $M_i(M_j)$ is the exporter's (importer's) GDP representing the country mass, $d_{ij}$is the distance between trading partners.

Although the gravity model works well empirically and has high explanatory power, its validity has not been guaranteed until Anderson (1979) firstly derived the theoretical foundation. Bergstrand (1990), Deardorff (1998), and Helpman, Melitz and Rubinstein (2008) provided alternative theoretical frameworks for the gravity model.

This paper adopted the theoretical model from Anderson and Van Wincoop (2003). The model assumes that goods are differentiated by origin; consumers in all regions have identical preference and taste, so their utility is presented by a constant elasticity utility function.

The theory starts with a utility maximization problem. The utility function to be maximized subjected to a budget constraint:

$$\text{Max} \quad U_j = (\sum_i \beta_i^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}})^{\frac{\sigma}{\sigma-1}}$$

$$\text{S.T.} \quad \sum_i p_{ij} c_{ij} = y_j$$

The nominal bilateral trade from country i to country j is obtained from the utility maximization problem:

$$x_{ij} = (\frac{\beta_i p_i t_{ij}}{P_j})^{(1-\sigma)} y_j$$

Where $P_j = [\sum_i (\beta_i p_i t_{ij})^{1-\sigma}]^{1/(1-\sigma)}$

Then with the market clearing condition: $y_j = \sum_j x_{ij}$, the $\beta_i p_i$ can be substituted into the demand equation, so the nominal demand of country j from country i becomes

$$x_{ij} = \frac{y_i y_j}{y^w} (\frac{t_{ij}}{\Pi_i P_j})^{1-\sigma}$$

Where Π_i and P_j are sum of bilateral trade resistance of country i and country j, respectively:

$$\Pi_i = (\sum_j (t_{ij}/P_j)^{1-\sigma} \theta_j)^{1/(1-\sigma)}$$

$$P_j = (\sum_j (t_{ij}/\Pi_i)^{1-\sigma} \theta_i)^{1/(1-\sigma)}$$

Where θ_j and θ_i are the income share of country j and country I, respectively. For simplicity, we used the fourth assumption: $t_{ij} = t_{ji}$, i.e., the bilateral trade costs are symmetric (Anderson and Van Wincoop, 2003). Then the gravity becomes:

$$x_{ij} = \frac{y_i y_j}{y^w} (\frac{t_{ij}}{P_i P_j})^{1-\sigma}$$

Where ${P_j}^{1-\sigma} = \sum_i {P_i}^{\sigma-1} \theta_i \, {t_{ij}}^{1-\sigma}$

According to the theoretical gravity equation, the multilateral resistance term must be included. What determine the bilateral trade between country i and country j are not only the bilateral trade cost between them, but also the trade cost between each of them and the rest of the world.

Since the trade cost is unobservable, Anderson and Van Wincoop (2003) define t_{ij} as the log-linear function of distance and dummy variables, such as regional trade agreement. However, this cost function may be misspecified, so the omitted variable biases still exist.

Anderson and Van Wincoop (2003) employ a non-linear estimation technique to obtain the multilateral resistance term. However, this method is not frequently used by others because it requires a lot of data (Estrella and Julitte, 2008). Also, using the NLS estimation technique will make the measurement error in internal distance worse (Anderson and

vanWincoop, 2003). Many studies employ the remoteness variables to represent the multilateral resistance term, but it is not theoretical justified (Anderson and vanWinccop, 2003). Feenstra (2002) points out using the country-specific effects as the multilateral resistance term. There are many empirical studies employ the country specific fixed effects method, such as Baier and Bergstrand (2008).

In addition to the basic model, many augmented model will include additional variables according to various research questions. (Frankel and Wei, 1998; Sarker and Sampath, 2007).

2.2 Gravity Model Specification

The effects of the tariffs reduction on the cheese trade between the EU and the US is one of our research question, so we add the tariffs variable to the basic A-Vw model. Instead of estimate the multilateral term directly, we add the country-specific effect into the model to account for its effect. Our basic gravity equation is:

$$x_{ijt} = \beta_0 Y_{it}^{\beta_1} Y_{jt}^{\beta_2} D_{ij}^{\beta_3} (1 + Tariffs_{ijt})^{\beta_4} PI_{it}^{\beta_5} PI_{it}^{\beta_6} e^{\beta_7 d_i + \beta_8 d_j} \varepsilon_{ijt}$$

Where x_{ijt} is the dollar value of the export from country i to country j in year t; Y_{it} and Y_{jt} are the GDPs of exporter i and importer j in year t, respectively; PI_{it} and PI_{jt} denote GDPs per capita of the exporter I and importer j, respectively. GDP and GDP per capita are included to indicate countries' economic and market size, which are related to the importing country's demand and exporting country's supply. GDPs per capita is used instead of the national population in my model because the gravity is employed to the specific product' bilateral trade flow (Berstrand, 1989), and it represents the capital endowment ratio of the country.

D_{ij} is the distance between importer's capital city and exporter's capital city (Brussels is used as the capital of the European Union); $Tariffs_{ijt}$ is the ad valorem tax the importer j imposes on the exporter i in year t. These two variables are used to capture the resistance between partners. The distance is a proxy of transportation cost. When the ad valorem tariff is applied, the importing price (1+Tariff) times the exporting price, so (1+Tariffs) is included into the equation.

d_i and d_j are the exporter fixed effects and importer fixed effects, respectively. Country-specific effects are used to represent the multilateral resistance term, which is critical according to A-Vw's theory since the bilateral trade between depends the comparison of the trade costs between them to trade costs of either of them with all the other trading partners. Also, country specific effects can account for characteristics that are not included in the independent variables, but still influence the trade, such as the country's specific endowment of cheese industry, such as temperature, water resources etc. ε_{ijt} is a log normal distributed error term and its mean equals 1.

The estimated coefficients of GDPs, GDPs per capita, distance and tariffs variables can be interpreted as the elasticities directly because they are exponents of the multiplicative form equation. The estimated parameter β_1, for example, shows how much 1% change in the exporting country's GDPs will influence the percentage change in the exports values. The effect of the dummy variable can be calculated as $\left(e^{estimated\ parameter} - 1\right) * 100\%$.

The estimated coefficients for the exporter's GDPs is expected to be positive. Because if the exporting country has higher income, it obtains more capital to spend on its production and more product are available for export. The importer's GDPs is expected to be positive as well. The higher national income shows higher imports (Martinez, 2003). Also, countries with larger economic size are assumed to trade more since countries will be more specialized on trade when they are richer (Rakhal and Sampath, 2007). The exporter's GDP also indicates the elasticity of substitution for the industry (Bergstrand, 1989). If the estimated coefficient of exporter's GDP is expected to positive, the elasticity of substitution of the cheese industry exceeds unity.

The sign of the estimated coefficient of exporter's GDPs per capita is ambiguous. (Frankel, 1997; Rakhal and Sampath, 2007) The GDP per capita shows consumers' purchase power in importing and exporting countries. (Kepaptsoglou, Matthew, and Dimitrios, 2010). It can also approximate the wage rate of the exporter (Fukao, Toshihiro and Robert, 2003).

The GDPs per capita of the exporter is obtained by dividing the GDPs by the national population and it supposed to have the opposite sign of the national population. The bigger country either have "absorbing effects" or obtain the economics of scale (Martinez, 2003)

Thus, the sign of the exporter's per capita GDPs is also unsure. Also, the GDP per capita implies the capital/labor endowment ratio of the exporter (Bergstrand, 1989). If its estimated coefficient is positive, showing the industry is capital-intensive.

The sign of the estimated coefficient of the importer's GDP per capita is also associated with the estimated industry. If the product is the normal goods, the sign is expected to be positive.

The estimated coefficient for the distance is expected to be negative since it is used to capture the effect of trade costs, such as transportation costs. Its usual magnitude is around 1, and it is expected larger for the cheese products. As diary product, cheese is easy to perishable, so the distance may have more negative effects on the cheese trade.

The sign for the tariffs is controversial. Intuitively, the tariff hinders the import, so the sign of its estimated coefficient should be negative. However, there may exist simultaneous effects of the tariffs (Baier and Bergstrand, 2006). Only when country A imports from country B, for example, will country A starts to impose tariffs.

Compared to tariffs, the EU's GIs protection is a more important part of the TTIP negotiation when it comes to the cheese trade between the US and the EU. Since the tariffs between the EU and the US are already not high, as the non-tariff barrier, GIs protection becomes a sticking point in negotiations. To investigate the effects of the GIs protection on the current cheese trade, we extend the basic gravity model with GIs variables:

$$x_{ijt} = \beta_0 Y_{it}^{\beta_1} Y_{jt}^{\beta_2} D_{ij}^{\beta_3} (1 + Tariffs_{ijt})^{\beta_4} PI_{it}^{\beta_5} PI_{it}^{\beta_6} e^{\beta_7 d_i + \beta_8 d_j + \beta_9 GIB_{ij} + \beta_{10} GIC_{ij} + \beta_{11} GID_{ij}} \varepsilon_{ijt}$$

Where GIB_{ij}=1 if both partner countries have agreement with the EU that includes the GIs protection, otherwise is 0; GIC_{ij}=1 if only the exporter has the agreement with the EU that includes the GIs protection, otherwise is 0; GID_{ij}=1 if only the importer has the agreement with the EU that includes the GIs protection, otherwise is 0. We assume that when countries have the agreement with the EU on GIs protection, they have higher protection standard for those authentic cheese products. Consumers in these countries are more familiar with these GIs names.

Many studies evaluate effects of free trade agreements on bilateral trade flows by intra-bloc dummy and openness dummy (Frankel et al., 1997; Sarker and Sampath, 2007).

Similarly, we consider those countries that have bilateral trade agreement with the EU on GIs protection in a "GIs Bloc", and GIB_{ij} is the intra-bloc variable. However, unlike other intra-bloc dummies are expected to have trade creation effects, the sign of this intra-bloc variable is ambiguous. GIs protection is more like non-tariff barriers if most countries in the world do not follow the same rules, so countries prefer to exports to those countries without these restrictions even themselves agree on the GIs protections. In this situation, the sign of GIB_{ij} should be negative. On the contrary, if most countries in the world start to accept EU's GIs protections, countries are more willing to trade with countries share the same standard. Thus, the sign of the GIB_{ij} is positive. To compare these two situations, we estimate augmented gravity model on two data sets: on the whole sample to simulate when the GIs protection are only applied to these few countries; on the sample restricted to countries have employed the GIs protection to simulate when the GIs protection becomes popular around the world.

GIC_{ij} and GID_{ij} are used as comparisons to GIB_{ij} to evaluate how the GIs protection affect the trade between countries with or without the GIs protections. Some former studies on effects of the free trade agreement include dummy variable to capture the trade diversion effects.

Combined with GIB_{ij}, GIC_{ij} describes how an exporter react to importer with or without GIs protection when itself employs the GIs protection. If the sign of the estimated coefficient of GIC_{ij} is positive and statistically significant, the exporters prefer an importer with lower protection level even itself agree on the GIs protection with the EU. Similarly, GID_{ij} represents whether an importer with GIs protection prefer an exporter with GIs protection.

After the effects of the GIs protection on the bilateral cheese trade is estimated globally, the augmented gravity model is estimated on the sample restricted to the exports from these 10 countries that all have bilateral agreement on GIs protections. Only the GIB_{ij} left in the model. In this model, we can evaluate the GIs protection on the cheese trade when the GIs protection system is accepted more broadly, which is the goal of the EU.

Chapter 3 Data and Estimation

3.1 Data

This paper uses panel data of the bilateral trade among 25 countries from the period 2000 – 2014. Apart from the US and the EU, 23 other countries are selected since they all have bilateral trade with the USA and EU. Among these 25 partners, we only have 2924 observations since the export values for 6076 observations were zero, so the zero issue is a problem in our dataset.

Apart from the whole sample, the "GIs bloc" sample is created to invest the long-term effects of the EU's GIs protection. Countries belong to the "GIs bloc" are listed in table3.1, who are already have bilateral trade agreement with the EU including the EU's GIs. Issued time of each agreement are listed as well. We assume consumers in countries belong to the "GIs bloc" are supposed to understand the value of the GIs protection.

Table 3.1 Countries have bilateral agreements with the EU on GIs protection

Countries	Colombia	Egypt	Israel	Jordan	Lebanon
Time entry into force	2011	2007	1993	2002	2007
Countries	Mexico	Turkey	Ukraine	Switzerland	
Time entry into force	2001	1992	2012	2011	

Data Source: http://www.efta.int/free-trade/free-trade-agreements

The cheese exports value data, country GDP and population, distance between two countries are from COMTRADE. The cheese data are collected in Harmonized System(HS) 4-digit level (0406). Tariffs are collected from UNCTAD - TRAINS. The panel data can deal with heteroscedasticity issue.

3.2 Estimation Method

The estimate method of the gravity model is still in debate and which method to employ should be specific to every application (Martinez, 2013). The most common approach it to take the natural logarithms of the multiplicative form of the gravity model and use the ordinary least squares (OLS) of the log-linear model (Egger, Kevin, 2016). However, the zero values of the dependent variables cannot be included in this method.

Also, the OLS approach assume the normally distributed of the error terms, which may not be true in many cases (Helpman, Melitz, and Rubinstein, 2007). In the gravity model, the heteroscedasticity will not only make the estimator inefficient, it is also inconsistent if they take log of the equation then use the OLS estimate because it violates the assumption of the OLS method (Santos and Tenrikyo, 2006 and 2011). In addition, Jensen's inequality, $E(lnX) \neq lnE(X)$, indicates the gravity model is better to be estimated in a multiplicative form.

The Pseudo Poisson Maximum Likelihood (PPML) estimator is proposed by Santos and Tenrikyo (2006). It is still consistent when there exist the zero-value issue since the multiplicative form of the gravity model can be estimated directly. Also, it can deal with the heteroscedasticity problem (Porojan, 2001). Consumers in different countries have different cheese consumption patterns. However, as globalization going, cheese consumption patterns are changing as more foreign cheese are available in all countries. As unobservable factors, these changes can be accounted for by this method.

We use the PPML in this paper since as the disaggregate data, the cheese exports values have more zero values compared to aggregate data and it is a huge issue in our research. Also, we graph the log error terms, it is obviously not normally distributed.

Both the basic equation and the augmented gravity model will be estimated on the whole sample, including 25 countries: EU, the US and other 23 countries who has bilateral cheese trade with both the US and EU. The estimate on whole sample can describe the cheese trade pattern around the whole world. Also, the augmented gravity equation will be estimated on the sample restricted to countries that have bilateral agreements on GIs protection, which are listed in Table1. The estimation based on this restricted dataset can describe the cheese

trade pattern of these countries, especially effects of GIs protection for them. Since these consumers in the "GIs bloc" obtain better understanding of the value of the GIs protection, estimation on the restricted sample can simulate the long-term effects of the TTIP. In the long term, the EU's GIs protection becomes more popular around the world and more consumers can accept its value to relate the GIs protection with cheese quality. In addition, the EU's GIs protection is accepted among these exporters, so the US is supposed to share same characteristics with these exporters when it agrees on the GIs protection provision in the TTIP.

The trade potential of TTIP in the short term on the cheese trade between the EU and the US will be predicted on the estimate results obtained from the model on the whole sample. There are two scenarios to be estimated: 50% of current applied ad-valorem tariffs with or without GIs protections. In both scenarios, we assume the GIs protection hasn't been accepted globally. In other words, both estimated results represent the TTIP's trade potential on bilateral cheese trade between the EU and the US in the short term.

Chapter 4 Results and Analysis

Estimated results for the whole sample and for the GIs countries exports model are both presented in Table 4.1. Results of the baseline gravity model without GIs protection dummies are in the first column. The trade potentials of TTIP with two different scenarios for cheese bilateral trade between EU and the US in 2014 are in Table 4.2. According the goodness fit test, p-value of both basic models and the augmented model are larger than the critical value, so fail to reject the null hypothesis and models are fitting well.

Table 4.1 Estimate Results

Independent Variables	Basic Gravity Model	Augmented Gravity Model	GIs bloc Model
Importer GDP, Y_{jt}	0.719***	0.699***	0.348*
	(0.171)	(0.167)	(0.189)
Exporter GDP, Y_{it}	2.268***	2.653***	3.709***
	(0.399)	(0.396)	(1.079)
Distance, D_{ij}	-1.287***	-1.295***	-2.696***
	(0.019)	(0.019)	(0.0989)
Importer GDP per capita, PI_{jt}	0.174	0.175	0.361*
	(0.179)	(0.174)	(0.185)
Exporter GDP per capita, PI_{it}	-2.369***	-2.787***	-3.496**
	(0.767)	(0.427)	(1.124)
Tariffs, T_{ijt}	-0.030**	-0.027*	0.054*
	(0.011)	(0.011)	(0.021)

Importer EU	-1.431*	-1.240*	-2.721**
	(0.749)	(0.730)	(0.865)
Importer the US	-0.428	-0.361	0.058*
	(0.662)	(0.646)	(0.054)
Exporter EU	0.296	-1.808	As Reference
	(2.433)	(2.390)	
Exporter the US	-0.301	-1.757	NA
	(2.295)	(2.247)	
GIB, GIB_{ij}		-0.182**	0.058
		(0.069)	(0.054)
GIC, GIC_{ij}		0.847***	
		(0.124)	
GID, GID_{ij}		-0.265*	
		(0.120)	
Constant	-36.341***	-41.583***	-48.559
	(6.222)	(6.174)	(15.454)
p-Value of Chi-squared test	0.3278	0.3278	0.3305

Note: *,**,*** indicate the significant level is 0.05, 0.01, 0.001, respectively

When the model is estimated on the whole sample data, the signs of all coefficients are all the same as expected. The first two columns in Table 4.1 are estimated on the whole sample. The elasticity of the importer GDP and the exporter GDP are both positive. However, the magnitude of the exporter GDP elasticity is more than three times the importer GDP elasticity for both datasets. The cheese exports are more sensitive to the change in the exporter GDP. For the cheese trade, the production capability is more important than the importer's market size. The elasticity of the distance is negative signed for both the basic model and the augmented gravity model and is close to the unit, which is the same as the

theory expects. The sign of the importer country per capita income elasticity is positive, which is opposite to the exporter country per capita income elasticity. People with higher income can spend more money on cheese products and they can purchase higher quality cheese. This effects in the importing country means more exports and in the exporting country means less exports. When the price is constant, the positive relationship between the cheese demand and the income shows cheese is normal goods here. The magnitude of the tariffs is larger in the basic gravity model than the augmented one. The coefficient of the partner EU (US) and reporter EU (US) is the country fixed effects of EU (US) as importer and exporter, respectively. The basic gravity model not only describes the multilateral trade resistance of each country, but it also controls for other unobservable determinants to trade specific to each country (Adam and David, 2007). Compared to the US, the EU faces less barriers when it trades cheese with all the other countries.

The three GIs dummy variables in the augmented gravity model together on the whole sample can shed some light to the effects on the GIs protection on the bilateral cheese trade on the world level. First, if both the importer and the exporter are conducting the GIs protection, the bilateral trade will decrease 19.96% ($(e^{0.182} - 1) * 100\%$), which is counterintuitive. However, when the GIs protection standard is only acknowledged in few countries around the world, the exporter prefers to trade with countries with lower standard. When the exporter in the GIs protection bloc cooperate with an importer not in the bloc, the exports will increase 133.26% ($(e^{0.847} - 1) * 100\%$), it is 153.22% higher than the aforementioned situation.

However, when the importer is in the GIs protection bloc, it prefers the exporter in the bloc to those are not. The exports from the non-GIs protection countries to the GIs protection countries is 10.38% ($(e^{0.182} - e^{0.265}) * 100\%$) lower than the exports between countries both accept the GIs protection system. In the countries with the GIs protection certification, consumers are more likely to distinguish the authentic cheese products from others, so they are more willing to import from countries also have same standard.

The third column is estimated on the GIs protection sample. The gravity model estimated on this bloc can capture some characteristics specific to exporters belonging to the GIs

protection blocs in terms of cheese trade. The only unexpected result is the sign of the estimated coefficient of the tariffs in the GIs protection bloc model. The positive sign indicates the simultaneous effects of the Tariffs in the GIs protection bloc (Baier and Bergstrand, 2006). In this model, all exporters accept the EU GIs protection system, and it is easier for their products to enter other countries. Thus, higher exports induce the tariffs imposed by importers.

The magnitude of the importer GDP's elasticity is nearly half of that on the whole sample. At the same time, its exporter GDP's elasticity is 1.5 times that of the whole sample. The production capability has more significant when all exporters are in the GIs protection bloc. Compared to the overall attitude of cheese exporters around the world, exporters belonging to GIs protection blocs are more sensitive to the trade cost caused by the distance and they are more willing the export cheese to closer partners.

The sign of the GIB_{ij} in this model is opposite to that in the whole sample model. In this dataset, exporters trade 5.97% ($(e^{0.058} - 1) * 100\%$) more with importers with the GIs protection. In the long term, when EU's GIs protection standard is advocated in more countries, the GIs protection would increase the cheese, which is contrary to the results in the short term.

The results of trade potential of the TTIP on the cheese trade between the EU and the US is estimated in two scenarios: the EU's strict GIs protection system is conducted in the US market, i.e., the EU's GIs protection is preserved in the TTIP or the EU and the US still use their own GIs protection policies, i.e., the EU's GIs protection is relaxed in the TTIP. In both scenarios, we conduct the sensitivity analysis to evaluate how the applied ad-valorem tariffs reduction will affect the cheese trade between the EU and the US. We set four levels of the current ad-valorem tariffs reduction: 25%, 50%, 75% and 99% reduction of current applied ad-valorem tariffs.

In both scenarios, the estimate is based on the estimated results from the second column of Table 4.1. After we get the estimated results of the bilateral cheese trade between the EU and the US when the TTIP is effective, we calculate the percentage change based on the actual cheese trade data on 2014. $\text{Change} = \frac{\text{Difference}}{\text{Actual } Value} * 100\% = \frac{Estimated\ Value - Actual\ Value}{Actual\ Value} *$

100%, and the estimated cheese exports value, the actual cheese trade value, the difference between the estimated value and the actual value, and the percentage change are presented in the column 3, 4, 5, 6, respectively, in both the Table 4.2 and Table 4.3. This estimation is on the whole sample, so there are two assumptions: the GIs protection hasn't been accepted by most countries; the estimation represents the effects of the TTIP in the short term.

Table 4.2 Trade Potential of the TTIP When the EU's GIs protection is Preserved

Exports	Tariffs Reduction	Estimate (1000 USD)	Actual (1000 USD)	Difference (1000 USD)	Change (%)
US-EU	25%	43271.11	29972.09	13299.02	44.37
US-EU	50%	43726.74	29972.09	13754.65	45.89
US-EU	75%	44491.74	29972.09	14519.65	48.44
US-EU	99%	46962.81	29972.09	16990.72	56.69
EU-US	25%	379101.81	1033362.08	-654260.27	-63.31
EU-US	50%	382755.86	1033362.08	-650606.22	-62.96
EU-US	75%	388546.54	1033362.08	-644815.54	-62.40
EU-US	99%	401909.05	1033362.08	-631453.03	-61.11

The first scenario is the EU's GIs protection preserved with different levels applied ad-valorem tariffs reduction. In this scenario, the US's cheese exports to the EU will increase at least 44.37% with 25% applied ad-valorem tariffs reduction. When only 1% tariffs remain, the US's cheese exports will increase 56.69%. On the contrary, the EU's cheese exports to the EU will decrease at least 61.11% when 99% applied ad-valorem tariffs are removed. With the 25% applied ad-valorem tariffs reduction, the EU's cheese exports to the US will decrease 61.11%.

In the short term, consumers in the US do not have the sense of the GIs protection cheese products even when producers obey the GIs protection standards. Thus, EU's cheese exports may divert to other countries. However, since consumers in the EU are familiar with the GIs protection system, they are more likely to pay for the US's GIs protection cheese, which is related to higher quality.

In this scenario, the tariffs reduction has more positive effects on the US' cheese exports than that for the EU's cheese exports. For the US, the difference between the effects of applied ad-valorem 25% tariffs reduction and that of 99% applied ad-valorem tariffs reduction is 12.32%; for the EU, the difference is 2.2%.

In the second scenario, not all the EU's GIs protected cheese names are applied in the US market, i.e., the EU's GIs protection is relaxed. We set this scenario follows the CETA signed between the EU and Canada, which is another possible negotiation results of the TTIP. In the scenario, the effects of the TTIP on the bilateral cheese trade between the EU and the US are accounted by different levels tariffs reduction. Both the EU and the US can export more cheese product to each other. However, the increase in the US's cheese exports to the EU is lower than the increase in the first scenario. When almost all the tariffs are removed in the second scenario, the US's cheese exports increase 44.21%, which is 0.16% lower than the least increase in the first scenario. Compared to the most gain in the first scenario, the US lose 12.48% increase in its cheese exports. This result still depends on consumers' preference in the EU. Consumers in the EU prefer authentic cheese product with GIs names, so their demand for the non-GIs protection cheese from the US decrease.

Table 4.3 Trade Potential of the TTIP When the EU's GIs protection is Relaxed

Exports	Tariff Reduction	Estimate (1000 USD)	Actual (1000 USD)	Difference (1000 USD)	Change (%)
US-EU	25%	39824.62	29972.09	9852.53	32.87
US-EU	50%	40243.96	29972.09	10271.87	34.27
US-EU	75%	40948.03	29972.09	10975.94	36.62
US-EU	99%	43222.27	29972.09	13250.18	44.21
EU-US	25%	1060827.78	1033362.08	27465.70	2.65
EU-US	50%	1071052.76	1033362.08	37690.69	3.65
EU-US	75%	1087256.64	1033362.08	53894.57	5.22
EU-US	99%	1124648.49	1033362.08	91286.41	8.83

The US's exports increase arise from lower trade costs with lower tariffs, and consumers are supposed to pay for lower price. The EU's exports increase 2.65%, 3.65%, 5.22%, and 8.83% when the applied ad-valorem tariffs are reduced 25%, 50%, 75% and 99%，

respectively. Lower trade costs from lower tariffs account for all EU's cheese exports. The EU's exports increase is lower than that of the US's exports because the current imposed by the EU is higher than that imposed by the US. For the EU, the GIs protection has more significant effects on its exports compared to the tariffs reduction. This results is similar to the core message from EU's economic assessment. (EU Commission, 2013)

The effects of the EU's strict GIs protection are different for the US's exports and the EU exports. These interesting results imply how people react to the GIs certification and people's preference, such as the taste to cheese, are important determinants to the effects of GIs protection on the cheese trade between the US and EU. If the US consumers don't react to the GIs protection similar to consumers in the EU do, the preservation of the GIs protection will not increase the EU's exports to the US. In addition, since GIs protection bring consumers more varieties to choose, their demand for the EU's cheese products may even decrease. People who used to purchase higher quality cheese may be more willing to pay higher prices after the GIs certification is applied since the quality of the cheese can be tracked now. The price of those GIs certificated cheese may be higher, but the cheese price for other products may be still same or even lower and the difference is changed cheese name. People who used to spend less money to cheese may prefer those names changed cheese product if their prices are lower. In addition, the GIs enforced by the EU may bring more choice consumers. Whether the GIs certification will increase the market power of GIs holders depends on consumers' preference as well. If consumers stick to those GIs names product, GIs holders' market power will increase. However, if consumers prefer new substitute, i.e. cheese with new names, their market power may become even lower.

Chapter 5 Conclusion

We use a country-fixed effects added gravity model to estimate the effects of TTIP on the cheese trade between on the US, the EU, and the rest of the world. Both the tariff decrease and GIs certification are considered in this paper. The zero value is a big issue with cheese exports data and the data is not normally distributed, so we use PPML rather than the OLS to get consistent estimator.

First we use the cheese trade data between the US, EU and other 23 countries from 2000 to 2014 to estimate the determinants of the bilateral trade flows. Both the basic and augmented gravity equation are estimated on the whole sample model. The augmented gravity equation is also applied to the GIs protection sample, i.e., the sample is restricted to exports from countries all have the bilateral agreement with the EU on GIs protection provisions. The results from two estimations can capture the cheese trade pattern around the world and of the GIs protection blocs respectively.

In the short term, when GIs certification of the TTIP negotiation is conducted, the US's cheese exports to the EU will increase 44.37%, 45.89%, 48.44% and 56.69% with; the EU's cheese exports from the EU to the US will decrease 63.31%, 62.96%, 62.4% and 61.11% with the applied ad-valorem tariffs decrease 25%, 50%, 75%, 99%, respectively. Consumers' different reaction to the GIs protection in the two countries can account for the different results. If the GIs certification is relaxed, the results will be opposite for the EU: its exports to the US will increase 2.65%, 3.65%, 5.22% and 8.83% with the applied ad-valorem tariffs decrease 25%, 50%, 75%, 99%, respectively. The US's exports to the EU will increase 32.87%, 34.27%, 36.62% and 44.21% with the applied ad-valorem tariffs decrease 25%, 50%, 75%, 99%, respectively. All US's cheese exports increases are lower than that in the first scenario. So, the GIs certification has more critical effects than the tariffs removal in the TTIP negotiation for the EU. In the short term, consumers in EU are more familiar with the GIs protection, and are willing to connect the cheese quality with GIs names. On the contrary, consumers in the US are not accustomed to the EU's GIs names and they are offered more varieties, their demand for the EU's cheese products may decrease. Under these

assumptions in the short term, the EU will loss from the TTIP and the US will gain benefit from the TTIP.

The EU intends to promote the GIs protection globally in the long term. In the long term, consumers in the US will obtain more knowledge about the GIs protection. Thus, their demand for the EU's GIs protection cheese will change. Further studies can be conducted on the long term effects of the TTIP on the cheese trade between the EU and US.

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