

# Trade Creation and Diversion Effects of a US-EU Transatlantic Trade and Investment Partnership

David Karemera<sup>1,\*</sup>, Louis Whitesides<sup>1</sup>, Gerald Smalls<sup>2</sup>

1. School of Business South Carolina State University Orangeburg, USA

2. Gerald Smalls School of Business Benedict College Columbia, USA

**Abstract:** The U.S. and the E.U. are currently in negotiations to create one of the world's most comprehensive free trade and investment agreements. This study empirically estimates and evaluates the potential impacts of the Transatlantic Trade and Investment Partnership commonly known as TTIP. Using U.S. import data from 1961 I to 2012IV from E.U. member countries, the study provides U.S. benefits from a TTIP. Traditional import demand models are specified and estimated for imports from each E.U. member country. The amount of trade expansion is estimated using import unit values elasticities from a dynamic import demand models. The findings show that, the elimination of all tariff and non tariff barriers, under a TTIP, the U.S. imports from E.U. member countries would increase by \$1.714 billion in trade creation and \$0.035 billion of trade diversion for a total trade expansion of more than 1.714 billion. The findings demonstrate that there are significant trade benefits attributable to a TTIP regime under a full implementation of the agreement and the removal of all tariffs and nontariff barriers. The amount of trade creation is greater than the amount of trade diversion in most cases.

JEL: F13, F15, F18

**Key words:** TTIP, dynamic import demand models, trade benefits, exchange rate changes

## I. BACKGROUND

In February 2013, the U.S. and the E.U. started negotiations to create one of the world most comprehensive free trade areas under the *Transatlantic Trade and Investment Partnership (TTIP)*. The free trade agreement commonly known as TTIP would lead to increased transatlantic free trade and investments among member countries. The US-EU free trade zone would create a market of about half of the world GDP and include about one third (1/3) of the world population. Since the two blocs are the world most developed economies, potentials benefits and challenges are enormous. This study will try to address consumer and producer benefits arising from the TTIP.

According to the E.U. Delegation in the U.S., "A phenomenal \$2.7 billion worth of trade flows between the E.U. and the U.S. on a daily basis, and more than \$3.7 trillion is already invested across the Atlantic..." E. U. Delegation (2013). Lester and Barbee (2013) suggest existence of large estimated gains from a TTIP. A free trade agreement between the U.S. and E.U will expand the trade flows and create business opportunities and challenges on both sides on the Atlantic. The TTIP would remove costly tariff and nontariff barriers to trade among member countries. TTIP would liberalize agricultural and nonagricultural sectors alike. The potential impacts of removal of barriers trade and their impacts is the subject of this study.

International trade theory states that under a free trade system, exports and trade flows are based on the principle of comparative advantage. However, bilateral and multilateral trade policy reforms affect trade flows. Thus the factors affecting the trade flows are not clearly known. The study seeks to provide estimates of potential impacts of a U.S. free trade agreement between the E.U. and U.S.

The European Union has evolved from the five founding countries in late 50s to a group of twenty eight (28) countries today. The competitive pressure led to the negotiation for the creation of the Transatlantic Trade and Investment Partnership. According to Bergkamp and Kogan (2013), Wróbel (2013), Caliendo and Parro (2015), the formation of a TTIP would create the world richest free trade bloc and yield major benefits for member countries. The E.U. has a membership with a population of over 400 million people and the United States has a population of over 300 million people. A U.S. free trade agreement with the E.U. would create a free market of over 700 million people with huge potential trade benefits for the consumers and producers in both trade blocks (Bonciu, 2013). This research addresses potential trade creation, trade diversion, and total trade expansion arising from a TTIP.

The major objective of the study is to analyze and evaluate the impacts of the TTIP on U.S. import from the E.U. member countries. Specific objectives are to identify and evaluate economic and noneconomic

\*Address correspondence to this author at the School of Business South Carolina State University Orangeburg, USA; Tel: (803) 536-7136; E-mail: Karemera@scsu.edu

factors affecting U.S. imports from the European Union countries. Trade creation and diversion attributable to a TTIP are evaluated and the impact of changes in the Euro-dollar exchange rates on the trade flows is examined.

## II. INTRODUCTION

The positive effects of the free trade agreements such as a Transatlantic Trade and Investment Partnership (TTIP) have been widely documented in literature. However opponents of free trade find arguments for protectionism as evidenced by the "Brexit", the pending exit of Great Britain from E.U. Moreover, less evident is the impact of exchange rate changes on the trade flows and whether the changes in exchange changes impair or enhance the positive effects of free trade agreements. The studies provided additional insights on the extent of trade benefits arising from a TTIP. Previous studies that have tried to estimate potential effects of regional economic integration include Jacobs (1991), Yamazawa (1992), Brown et al., (1975 and, 1992), Karemera and Koo (1994), Wyllie (1995); Costinot, and Rodríguez-Clare (2013), Caliendo, and Parro (2015), and Karemera et al. (2015) among many others.

Several studies have addressed potential impacts of a TTIP on trade and showed huge trade gains for both the E. U. and U.S. However, there are large differences in the estimated impacts. Egger *et al.* (2015) found an increase in trade expansion of 80% between E.U. and U.S. in the form of trade creation and diversion with third countries. Aichele *et al.* (2014) predict an average bilateral trade increase of 193% while Felbermayr *et al.* (2015) suggest that welfare gains under a TTIP will exceed 100%. Bekkers and Rojas-Romagosa (2015) offers an excellent survey of literature on economic impacts of TTIP.

When countries embark on a free trade pact, two possible outcomes are common: the trade creation (TC) and/or trade diversion (TD) (Balassa, 1975; Wonnacott and Wonnacott, 1982; Pomfret, R., 1986). TC occurs when lower priced imports from a country's free trade partners replace higher priced domestic substitutes, while TD occurs when restricted imports from nonbeneficiary countries are diverted beneficiary countries. The analysis herein focuses on U.S. imports from the E.U. member countries and the evaluation of potential TC and TD and total trade expansion attributable to TTIP. The pertinent factors affecting the U.S. import from the E.U. member countries are addressed.

The rest of the paper is organized as follows. Section III presents a brief development of the empirical specification of the U.S. bilateral trade models. The estimation results and the behavior of U.S. import demand from European Union member countries are discussed in section IV. Section V outlines a theoretical foundation of trade creation and diversion effects of a free trade agreement. The last section presents concluding remarks.

## II. MATERIALS AND METHODOLOGY: THE IMPORT DEMAND BEHAVIOR

### The Specification of Classical Import Demand Model:

The classical estimation of a country's import demand function has traditionally been based on the following assumptions (Tracy Murray and Peter J. Ginman, 1976; and Koo and Uhm, 1991). Imports are directly proportional to the importing country's national income (GDP). They are inversely proportional to import prices, and are directly proportional to prices of import-competing commodities and/or domestic inflation. Hence, the following specification of the static classical import demand model provides a basis for this study:

$$\ln Q_{it} = \alpha_0 + \alpha_1 \ln MP_{it} + \alpha_2 \ln DP_{it} + \alpha_3 \ln Y_t + \ln \epsilon_{it} \quad (1)$$

where  $Q_{it}$  is the value of U.S. imports from European Union member country;  $MP_{it}$  is the bilateral unit value index of imports;  $DP_{it}$  represents U.S. domestic inflation index and  $Y_t$  is a measure of the U.S. national income. The subscript  $i$  identifies an E.U. member country. The subscript  $t$  identifies the time series index.  $\ln$  represents natural log;  $\alpha$  is an estimable parameter and  $\epsilon_{it}$  represents a disturbance term. Equation #1 hypothesizes that  $MP_{it}$  is negatively related to import demand ( $Q_{it}$ ) and that  $DP_{it}$  and  $Y_t$  are positively related to imports demand ( $Q_{it}$ ).

Equation #1 has the sound theoretical foundation that supports empirical inferences, (Goldstein and Khan, 1978; Koo and Uhm, 1991, Karemera and Koo, 1994, Karemera *et al.* (2015). To account for import dynamics, a lagged dependent variable was included under the partial adjustment hypothesis and the seasonal behavior of imports is captured by the seasonal dummy variables.

Currency appreciation leads to an increase in imports and a decrease in expensive exports. For example, a U.S. dollar appreciation against the Euro would lead to increased U.S. imports from European

Union but reduced U.S. exports to European Union. Conversely, the U.S. Dollar depreciation would lead to increased E.U. exports to the U.S. and reduced E.U. imports from the U.S. However, the impacts of exchange rates on the trade flows remain an empirical issue.

The dynamic system of the U.S. import demand from European Union is specified as:

$$\ln Q_{it} = \beta_0 + \beta_1 \ln MP_{it} + \beta_2 \ln DP_{it} + \beta_3 \ln Y_t + \beta_4 R_t + \beta_5 Q_{it-1} + \beta_6 D_{2t} + \beta_7 D_{3t} + \beta_8 D_{4t} + U_{it} \quad (2)$$

where,  $R_t$  denotes the changes in exchange rate,  $D_t$  a quarterly dummy variable, and  $Q_{it-1}$ , a lagged dependent variable, and other variables have been previously defined.

Equation #2 is a dynamic system of seemingly unrelated specifications of U.S. import demand models (see Zellner, 1962 and Wang and Fuller, 1981). The system contains lagged dependent variables ( $Q_{it-1}$ ) and autocorrelated error terms ( $U_{it}$ ). Thus, the estimation method is the Nonlinear estimator proposed Gauss Newton and available in Regression Analysis of Time Series (RATS) Program published by Estima (2010, P.550-555). The results are presented below.

Before discussing the estimation results, some remarks about the expected signs of the estimated coefficients are in order. U.S. income was included in model specification to represent the U.S. domestic market and the import absorption capacity. A per capita income has been traditionally used to represent level of development and living standards in importing countries. A rise in per capita income should be associated in increased imports and a positive coefficient sign is expected

The import price coefficients are expected to be negatively related to imports. A rise in import prices lead to reduced imports and vice versa. Moreover, a rise in the domestic inflation should lead to an increase in imports as lower priced imports displace higher cost domestic output. Currency appreciation leads to increased imports. Currency depreciation has reverse effects.

#### IV. ECONOMETRIC RESULTS

##### A: Data Source

The sampling period is from 1961 I to 2012IV. Quarterly U.S. imports from European Union member countries, import unit values, domestic wholesale price

indexes and GDPs were obtained from the International Financial Statistics. European Union countries included in the study are shown in table 1. Former Soviet Union countries that recently joined the E.U. were excluded from the analysis due to the data limitation.

##### B. THE U.S. IMPORT DEMAND FROM THE EUROPEAN UNION MEMBER COUNTRIES

Table 1 also provided summary statistics of data used for the last 3 years of the study period. The figures show that, on average U.S. import from European Union member countries reached 16.4 % in the last 3 years. Germany and United Kingdom are the largest U.S. trade partners on the last the 3 average respectively 4.0 % and 2.8 % of U.S. total imports from the world in the last three years.

Econometric estimates are presented in table 2. The estimated models of U.S. imports from European Union have the expected signs and are significantly different from zero at the 5% level in most cases. Thus, the models are adequate and fit the import demand behavior under the classical import demand model specification. All models were estimated by the nonlinear methods available in RATS 2010.

##### 1. EFFECTS OF U.S. INCOME ON U.S. IMPORTS FROM EUROPEAN UNION MEMBER COUNTRIES

All income elasticity coefficients are positive and significant at 5% or higher. The results indicate that an increase in U.S. incomes lead to increased imports from all European Union member countries almost uniformly. Most countries show income elasticity less than 1.0 suggesting that the imports are not responsive to change in U.S. income. However, the imports from Bulgaria, France, Finland, and Malta have income elasticity greater than 1.0 suggests that the imports from the four countries are sensitive to change in income in the U.S.

##### 2. THE EFFECTS OF PRICES AND EXCHANGE RATE

The estimated elasticity coefficients of the import unit values have the expected signs and are significant of most cases as indicated by the t-statistics. The price elasticities are less than 1.0 indicating that the imports are not responsive to change in import prices. However, as shown by the relative magnitude of the elasticities, for most countries included in the analysis, a rise in domestic inflation lead to increased U.S.

**Table 1. U.S. imports from European Union by members country (in 1,000 US \$)**

| Country                               | 2010       | 2011       | 2012       | Mean       | Ratio*   |
|---------------------------------------|------------|------------|------------|------------|----------|
| Austria                               | 7005100    | 9716000    | 9695100    | 8805400    | 0.004022 |
| Belgium                               |            |            |            |            |          |
|                                       | 15899200   | 17807800   | 17701200   | 17136067   | 0.007826 |
| Bulgaria                              | 273700     | 433600     | 520200     | 409167     | 0.000187 |
| Cyprus                                | 11700      | 22000      | 30400      | 21367      | 0.00001  |
| Denmark                               | 6140100    | 6909500    | 6894300    | 6647967    | 0.003036 |
| Finland                               | 4033300    | 4585100    | 5317700    | 4645367    | 0.002122 |
| France                                | 39256700   | 40776300   | 42491800   | 40841600   | 0.018653 |
| Germany                               | 84373400   | 100408300  | 110611800  | 98464500   | 0.04497  |
| Greece                                | 845800     | 911100     | 1051900    | 936267     | 0.000428 |
| Ireland                               | 34024700   | 39356100   | 33436400   | 35605733   | 0.016262 |
| Italy                                 | 29432000   | 35093200   | 38151500   | 34225567   | 0.01631  |
| Luxembourg                            | 471300     | 515400     | 565400     | 517367     | 0.000236 |
| Malta                                 | 269600     | 253400     | 264700     | 262567     | 0.00012  |
| Netherlands                           | 19575800   | 24093400   | 22937700   | 22202300   | 0.01014  |
| Poland                                | 3106900    | 4529200    | 4787300    | 4141133    | 0.001891 |
| Portugal                              | 2225400    | 2677700    | 2706200    | 2536433    | 0.001158 |
| Spain                                 | 8884200    | 11423700   | 12221700   | 10843200   | 0.004952 |
| Sweden                                | 10865500   | 11801700   | 10490700   | 11052633   | 0.005048 |
| United Kingdom                        | 50664000   | 52156700   | 55975600   | 52932100   | 0.024175 |
| Total US Imports from Europe          | 317360410  | 363472211  | 375853612  | 35222874   | 0.160867 |
| Total US Import from the World        | 1968115200 | 2264979600 | 2335604900 | 2189566567 | 1        |
| *Ratio is a proportion of world total |            |            |            |            |          |

imports from the E.U. member countries. The size and significance of elasticities suggest that most imports seem to be more responsive to U.S. domestic price changes than to the bilateral import unit price changes. These findings are consistent with literature and indicated that domestic markets are competitive in international markets for all commodity groups (e.g., Karemera and Koo, 1994). The findings show that the exchange rate has no significant effect on the imports for most countries included in the analysis. The exceptions include the UK, Italy, Malta, and Cyprus where changes in exchange rates significantly affect U.S. imports from those four countries.

### 3. THE DYNAMIC AND SEASONAL BEHAVIOR OF U.S. IMPORTS FROM EUROPEAN UNION

The lagged dependent variables were included to account for import dynamics under the partial adjustment hypothesis. All coefficients on the lagged

dependent variables are less than unity and significant at 1% level, implying that the estimated models are stable. Thus, the results show strong dynamics of U.S. import from the E.U. Seasonal dummy variables were included in the model to account for and assess seasonality on the import behavior. The estimation results show that most seasonal dummy variables are significant and most imports exhibit strong seasonality.

### V. POTENTIAL TRADE CREATION AND TRADE DIVERSION EFFECTS OF A TTIP

#### General theoretical background

A beneficiary country is a country that removes tariff barriers under a free trade agreement. Beneficiary country imports displace higher cost domestic products, a trade creation. A non-beneficiary country is a trade partner that still faces tariffs. Import demand in the non-beneficiary country increases by substitution

**Table 2: Nonlinear estimates of US Imports from European Union by member countries:1961I-2012W (Used GDP per capita)**

| Country     | Constant  | US income per capita | Import Unit Value | US Inflation | Exchange Rate | Lagged Dep. | QTR 2   | QTR 3        | QTR 4        | df  | R2    | SEE   | Log Likelihood |
|-------------|-----------|----------------------|-------------------|--------------|---------------|-------------|---------|--------------|--------------|-----|-------|-------|----------------|
| Austria     | -2.091*** | 0.539**              | -0.22***          | 1.625        | -0.048        | 0.83***     | 0.2***  | 0.138**<br>* | 0.115***     | 198 | 0.992 | 0.142 | 115.19         |
|             | (-3.54)   | (4.2)                | (-2.96)           | (1.04)       | (-0.62)       | (22.35)     | (6.97)  | (4.95)       | (4.08)       |     |       |       |                |
| Belgium     | 1.887     | 0.997***             | 0.468***          | 5.771**<br>* | -0.069        | 0.273**     | -0.014  | -0.06***     | 0.048*       | 54  | 0.952 | 0.058 | 94.583         |
|             | (1.33)    | (4.37)               | (3.32)            | (4.26)       | (-0.88)       | (2.45)      | (-0.66) | (-2.69)      | (1.99)       |     |       |       |                |
| Bulgaria    | -8.98***  | 1.862***             | -0.496*           | -1.458       | -0.346        | 0.42***     | -0.4*** | -0.59***     | -0.36***     | 161 | 0.885 | 0.546 | -133.766       |
|             | (-3.86)   | (5.26)               | (-1.78)           | (-0.2)       | (-1.21)       | (5.97)      | (-3.05) | (-4.93)      | (-3.05)      |     |       |       |                |
| Cyprus      | -2.258    | 1.284***             | -0.764**          | (4.675)      | 0.611**       | 0.39***     | 0.11    | 0.263**      | 0.1          | 138 | 0.61  | 0.459 | -89.593        |
|             | (-1.24)   | (4.11)               | (-2.05)           | (0.71)       | (2.31)        | (4.95)      | (0.99)  | (2.44)       | (0.91)       |     |       |       |                |
| Denmark     | -0.523    | 0.501***             | -0.125**          | 3.598**<br>* | (0.048)       | 0.76***     | 0.07*** | (0.016)      | 0.103**<br>* | 198 | 0.99  | 0.121 | 147.696        |
|             | (-1.36)   | (5.23)               | (-2.27)           | (2.72)       | (0.77)        | (17.19)     | (2.95)  | (0.66)       | (4.25)       |     |       |       |                |
| Finland     | -3.841*** | 1.356***             | -0.39***          | 3.159**      | -0.019        | 0.49***     | 0.054*  | -0.067**     | 0.051*       | 198 | 0.99  | 0.145 | 110.343        |
|             | (-6.33)   | (8.26)               | (-5.15)           | (1.99)       | (-0.26)       | (8.32)      | (1.85)  | (-2.32)      | (11.76)      |     |       |       |                |
| France      | -0.588**  | 1.191***             | -0.001            | 3.333**<br>* | 0.008         | 0.41***     | 0.07*** | 0.015        | 0.075**<br>* | 198 | 0.996 | 0.089 | 211.027        |
|             | (-2.03)   | 9.03                 | (-0.04)           | (3.34)       | (0.17)        | (6.4)       | (3.52)  | (0.85)       | (4.24)       |     |       |       |                |
| Germany     | -0.842*** | 0.611***             | -0.17***          | 4.583**<br>* | 0.025         | 0.76***     | 0.07*** | 0.005        | 0.106**<br>* | 198 | 0.996 | 0.086 | 218.056        |
|             | (-2.96)   | (5.83)               | (-3.85)           | (4.38)       | (0.57)        | (17.94)     | (3.9)   | (0.31)       | (6.18)       |     |       |       |                |
| Greece      | 3.929***  | 0.822***             | 0.355**           | 3.867        | -0.014        | 0.21***     | -0.1    | -0.37***     | -0.141**     | 198 | 0.921 | 0.313 | -48.628        |
|             | (3.7)     | (5.45)               | (2.45)            | (1.13)       | (-0.09)       | (2.93)      | (-1.57) | (-5.83)      | (-2.24)      |     |       |       |                |
| Ireland     | -3.891*** | 0.696***             | -0.38***          | 2.238        | 0.002         | 0.88***     | 0.12*** | 0.141**<br>* | 0.21***      | 198 | 0.994 | 0.17  | 78.178         |
|             | (-3.93)   | (4.03)               | (-3.41)           | (1.21)       | (0.02)        | (29.43)     | (3.31)  | (4.2)        | (6.23)       |     |       |       |                |
| Italy       | -0.703**  | 0.899***             | -0.14***          | 5.817**<br>* | 0.088**       | 0.59***     | 0.034*  | 0.045**<br>* | 0.039**      | 198 | 0.996 | 0.087 | 216.06         |
|             | (-2.49)   | (7.88)               | (-3.35)           | (5.48)       | (1.98)        | (11.42)     | (1.94)  | (2.64)       | (2.25)       |     |       |       |                |
| Luxembourg  | 5.564     | 0.439                | 0.843*            | 4.92         | -0.024        | 0.202       | -0.014  | 0.075        | 0.008        | 54  | 0.464 | 0.227 | 8.94           |
|             | (1)       | (0.75)               | (1.78)            | (0.97)       | (-0.08)       | (1.53)      | (-0.16) | (0.91)       | (0.1)        |     |       |       |                |
| Malta       | -8.732*** | 1.38***              | -0.67***          | 7.785**      | 0.224*        | 0.74***     | 0.21*** | 0.246**<br>* | 0.309**<br>* | 149 | 0.979 | 0.237 | 8.201          |
|             | (-4.82)   | (4.73)               | (-3.54)           | (2.41)       | (1.76)        | (14.17)     | (3.64)  | (4.57)       | (5.66)       |     |       |       |                |
| Netherlands | -1.086*** | 0.577***             | -0.119**          | 5.922**<br>* | 0.036         | 0.76***     | 0.11*** | 0.076**<br>* | 0.108**<br>* | 198 | 0.994 | 0.107 | 173.23         |
|             | (-3.19)   | (6.25)               | (-2.48)           | (5.04)       | (0.65)        | (17.86)     | (4.86)  | (3.59)       | (5.09)       |     |       |       |                |
| Poland      | -0.95**   | 0.275***             | -0.19***          | 3.475**      | -0.118        | 0.93***     | 0.04    | -0.012       | -0.005       | 198 | 0.986 | 0.142 | 115.586        |
|             | (-2.11)   | (3.39)               | (-2.82)           | (2.2)        | (-1.43)       | (35.59)     | (1.41)  | (-0.42)      | (-0.19)      |     |       |       |                |
| Portugal    | -2.369*** | 0.957***             | -0.37***          | 4.00**       | -0.01         | 0.64***     | 0.026   | 0.006        | -0.004       | 198 | 0.986 | 0.152 | 100.517        |
|             | (-4.34)   | (6.78)               | (-4.64)           | (2.4)        | (-0.13)       | (12.28)     | (0.85)  | (0.19)       | (-0.12)      |     |       |       |                |
| Spain       | -0.844**  | 0.402***             | -0.104**          | 5.449**      | 0.052         | 0.84***     | 0.038*  | -0.004       | 0.058**      | 198 | 0.994 | 0.108 | 171.643        |
|             | (-2.43)   | (4.76)               | (-2.14)           | (4.23)       | (0.94)        | (23.65)     | (1.74)  | (-0.17)      | (2.69)       |     |       |       |                |

|                |         |          |         |              |         |         |         |          |              |     |       |       |         |
|----------------|---------|----------|---------|--------------|---------|---------|---------|----------|--------------|-----|-------|-------|---------|
| Sweden         | -0.668* | 0.678*** | -0.066  | 3.357**      | 0.138** | 0.68*** | 0.054** | -0.18*** | 0.145**<br>* | 198 | 0.993 | 0.113 | 162.186 |
|                | (-1.76) | (5.52)   | (-1.27) | (2.6)        | (2.32)  | (12.61) | (2.36)  | (-7.92)  | (6.04)       |     |       |       |         |
| United Kingdom | 0.512*  | 0.829*** | -0.064* | 4.972**<br>* | 0.11*** | 0.56*** | 0.10*** | 0.05***  | 0.108**<br>* | 198 | 0.996 | 0.078 | 238.424 |
|                | (1.89)  | (8.23)   | (-1.82) | (5.69)       | (2.62)  | (10.66) | (5.79)  | (3.25)   | (6.95)       |     |       |       |         |

\*\*\*Significant at .01 level  
 \*\*Significant at .05 level  
 \*Significant at .1 level

imports from the third countries imports that still face tariffs and whose exports are diverted to another non-beneficiary country. These imports are replaced by preferred source's imports, a trade diversion to the beneficiary country. Complete elimination of tariffs will yield consumer gains through trade creation, diversion effects and a trade expansion under a TTIP. A welfare analysis presented in Figures 1 and 2 shows a graphical illustration for an importing country's welfare changes under a free trade agreement.

**1.WELFARE ANALYSIS OF TRADE CREATION EFFECTS:**

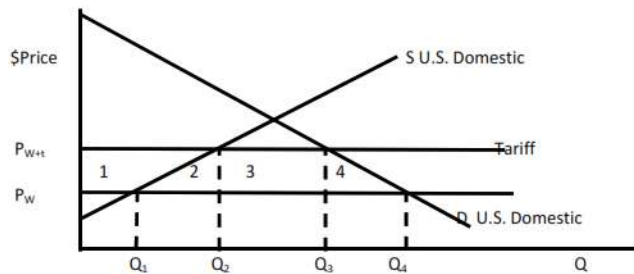


Figure 1: Analysis of Trade creation effects of a free trade agreement

Figure 1 shows that the removal of tariffs (t) reduces world import prices ( $P_w$ ) from  $P_{w+t}$  to  $P_w$ . Quantity bought rises from  $Q_3$  to  $Q_4$ , leading to an increase in domestic **consumer surplus** represented by the area 1+2+3+4.

Figure 1 shows that the removal of tariffs (t) reduces world import prices ( $P_w$ ) from  $P_{w+t}$  to  $P_w$ . Quantity bought rises from  $Q_3$  to  $Q_4$ , leading to an increase in domestic consumer surplus represented by the area 1+2+3+4. In the above figure1, trade creation is associated with loss of domestic producer surplus. Domestic producers in importing country such as U.S. will sell less at reduced prices as consumer buy cheaper imports. The decline in producer surplus is shown by area 1. Government will lose tax revenue

from removed import tariffs represented by the area 3. However, the diagram shows there is a net gain from removing tariff barriers that is represented by the area 2+4, a *trade creation effect*. The size of trade creation will depend upon elasticity of demand and supply. If demand and supply are inelastic, the net gains are much lower.

**2. WELFARE OF ANALYSIS OF TRADE DIVERSION EFFECTS**

Trade diversion occurs when restricted imports from nonbeneficiary countries are displaced by imports from beneficiaries. A non-beneficiary country is a trade partner, non-member of a FTA, whose products still face tariffs. The imports from more efficient nonbeneficiary countries are displaced by imports from relatively less efficient FTA members.

The welfare effects of trade diversion are presented in a graphical illustration below. Figure 2 shows U.S. domestic D and supply, S. The pre-TTIP import prices including tariff is  $P_b^T$ . The prevailing world price with tariff is  $P_w^T$ , lower than  $P_b^T$ , reflecting production efficiency from nonbeneficiary rest of world countries. Trade diversion now takes place as consumption switches from the low cost producers to the higher cost beneficiary products. Lower cost imports from the rest of the world have been replaced by high cost imports from TTIP members.

The FTA between U.S. and E.U. would reduce the prices of TTIP imports from  $P_b^T$  to  $P_b$ , with tariff removed for TTIP beneficiary countries. The prices of U.S. imports from TTIP countries are reduced to  $P_b$ , lower than  $P_w^T$ , increasing consumer surplus by areas A+ B+C+ D. The produce surplus decreases by the area A. Government tariff revenues are reduced by areas C + E. The net welfare gains are represented by area B +D. The loss in government tariff revenues is E. if area B+D is greater than area E, the TTIP is trade expanding. If B+D is less than E, the TTIP is trade diverting. In general, trade benefits of a FTA arise from increased trade among members through trade

creation and substitute trade among members with nonbeneficiary countries.

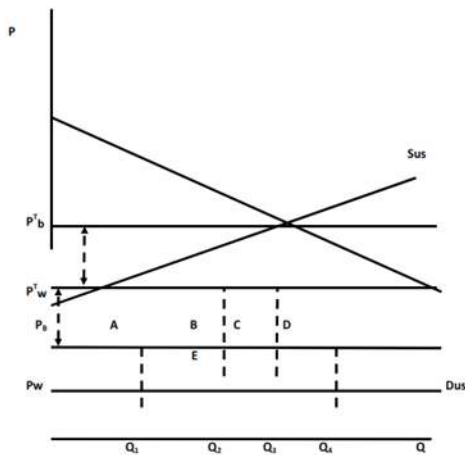


FIGURE 2: GRAPHICAL ANALYSIS OF TRADE DIVERSION EFFECTS

**B. EMPIRICAL MEASURES OF TRADE CREATION AND DIVERSION:**

The effects of removing or lowering trade barriers between two trade partners can be further evaluated by computing trade creation (TC) and trade diversion (TD) for each participating country. Most researchers use either the Baldwin and Murray (1977) method, or Verdoorn and Bochove, 1972) method to estimate TC and TD. The Baldwin and Murray methods for computing TC and TD effects are as stated in equations #3 and #4, respectively.

$$TCi = M\eta i(\delta ti/1 + ti) \quad (3)$$

$$TDi = TCi(MNi/Vi), \quad (4)$$

**TCi** = trade creation effects for U.S. imports from E.U.-country i,

**Mi** = initial level of U.S. imports from E.U.-country i

**$\eta i$**  = price elasticity of U.S. import demand from E.U.-country i,

**$\delta i$**  = level of tariff cut under TTIP on U.S. imports from E.U.-country i ,

**ti** = initial level of tariff on U.S. imports from E.U.-country i,

**TDi** = trade diversion effects for U.S. imports from E.U.-country i,

**MNi** = U.S. imports from non TTIP countries and

**Vi** = total U.S. domestic production.

According to Verdoorn's method, TC is based on equation #3. However, the Verdoorn and Bochove's (1972) estimates of TD is calculated differently as shown in equation #5:

$$TDi = TCi(Mi/(MNi + Mi)), \quad (5)$$

where  **$Mi/(MNi + Mi)$**  is the ratio of U.S. imports from EU-country i to the total U.S. imports. All other individual variables remain as previously defined.

**1.THE POTENTIAL U.S. ECONOMIC BENEFITS FROM THE TTIP**

For the empirical implementation of the integration theory, Baldwin and Murray's method requires each country's domestic production, which is usually unavailable. Hence, the Verdoorn formula, which does not have a similar input requirement problem, is predominantly used to compute TD (Sawyer and Sprinkle, 1989). In this exercise, we alternatively estimate the U.S. import demand from E.U. member countries and compute the consumer potential gains under a TTIP.

Trade Creation and trade diversion effects are calculated based on the estimated import demand elasticities and the 2010-12 average imports levels shown in **Table 1**. The average tariff rates were obtained from the Harmonized Tariff Schedule of the United States. TD effects are calculated by using the Verdoorn and Bochove equation #5.

**Tables 3** indicate TC and TD results. All results show that the magnitudes of the U.S. import price elasticities are generally lower than the magnitudes of the U.S. domestic price elasticities. Relative to import markets, the U.S. import demand behavior indicates that the U.S. has large competitive internal markets. Although the relative size of tariff rates are already low at average of 2.92 % and the unit values are small in absolute values, the sheer size of the trade volume between E.U. and U.S. insure large consumer trade benefits and trade expansion under a full implementation of the TTIP.



**Table 3: Potential Effects of a TTIP on U.S. Imports from EU Countries ( \$1000.00).**

| Country             | Trade Creation   | Trade Diversion | Trade Expansion  |
|---------------------|------------------|-----------------|------------------|
| Austria             | 56,423           | 227             | 56,650           |
| Belgium             | 233,583          | 1,828           | 235,411          |
| Bulgaria            | 5,911            | 1               | 5,912            |
| Cyprus              | 475              | 0               | 475              |
| Denmark             | 24,204           | 73              | 24,277           |
| Finland             | 52,632           | 112             | 52,744           |
| France              | 1,190            | 22              | 1,212            |
| Germany             | 473,203          | 21,280          | 494,483          |
| Greece              | 9,681            | 4               | 9,685            |
| Ireland             | 387,861          | 6,307           | 394,168          |
| Italy               | 136,570          | 2,135           | 138,705          |
| Luxemburg           | 12,703           | 3               | 12,706           |
| Malta               | 5,147            | 1               | 5,147            |
| Netherlands         | 76,954           | 780             | 77,734           |
| Poland              | 22,434           | 42              | 22,477           |
| Portugal            | 27,482           | 32              | 27,514           |
| Spain               | 32,845           | 163             | 33,008           |
| Sweden              | 21,247           | 107             | 21,354           |
| United Kingdom      | 98,670           | 2,385           | 101,055          |
| <b>Total Europe</b> | <b>1,679,215</b> | <b>35,503</b>   | <b>1,714,717</b> |

**Table 3** shows that, under complete elimination of tariff barriers, the U.S. imports from E.U. member countries would increase by more than \$1.67 billion in trade creation and \$0.035 billion of trade diversion for a trade expansion of more than \$1.71billion attributable to TTIP. The outcome is partly due to the replacement of higher-cost domestic products with partners' imports and trade diversion from non beneficiary country to U.S. (Egger *et al* (2015). The differing country-specific effects are based on the average imports for the last 3 years and estimated import unit value elasticities. Trade expansion would occur in response to a complete removal of all tariff and non tariff barriers. The trade creation and diversion from Germany and UK are the largest trade increase. Clearly, TC is generally greater than TD in all countries.

The preceding deductions from our empirical results are short-run TTIP benefits. The U.S. should be expected to experience more TTIP benefits in the medium- and/or long-run. In fact, we expect the income elasticities of imports for East European Union member countries to become more important than it

appears when the countries experience income growth. Perhaps, this growth would come as a result of the initial benefits offered by the implementation of TTIP and increases in E.U. membership.

## V. CONCLUSION

The paper estimated the U.S. import demand for E.U. countries and examined the potential trade creation and diversion effects of a TTIP. The results reveal that a Transatlantic Trade and Investment Partnership will have significant impacts on trade between U.S. and E.U. The U.S income, imports prices and domestic inflation are major factor affecting the imports. The effects of exchange rate changes are insignificant factors for the majority of the imports from E.U. countries and remain largely country-specific.

Overall, the removal of all tariff and non tariff barriers under a TTIP would increase U.S. trade to an estimated trade expansion of about \$1.71billion in U.S. imports alone from for the E.U. countries included in the analysis. The finding is consistent with Egger *et al.* (2015).The documented price and income elasticities estimates suggest that the U.S. will benefit from initial trade increases attributable to TTIP. The income and import price elasticities of individual countries suggest that impacts of TTIP vary significantly by country. For instance, the removal of tariff and non-tariff barriers will have greater effects on U.S. imports from the European two largest economies, Germany and United Kingdom respectively. TTIP elicits more trade creation than trade diversion.

However, our study addresses the static effects of TTIP by assuming that industries and market structures in all TTIP countries remain unchanged. However, in the long run, industries change in adjustment to changing availability of resources, evolving market structures, new technologies and accession of other countries to European Union benefits. It is expected that new European Union member countries will see their national incomes rise. These income changes will lead to more investments and more trade with the U.S. Thus, in the long run, the actual effects of TTIP could turn out to be larger for individual countries than those suggested by our research.

## ACKNOWLEDGMENTS

The authors acknowledge partial support from the 1890 Research Program and the School of Business at South Carolina State University. Any conclusion,



recommendations are the opinion of the authors and do not necessarily represent the position of South Carolina State University/1890 Program or the United States Department of Agriculture.

Suggestions from Seminar participants at the School of Business improved the quality of the paper. Kermit Rose provided able computer assistance. The usual disclaimer applies.

## REFERENCES

- [1] Balassa, B. Trade Creation Trade Diversion in the European Common Market: An Appraisal of the Evidence. In *European Economic Integration*, Bela Balassa, ed., Amsterdam, North Holland.
- [2] Baldwin, R.E. and T. Murray. MFN Tariff Reductions and LDC benefits under GSP. *The Economic Journal*. January 1, 1977; 30-46.
- [3] Bekkers, E. and H. Rojas-Romagosa (2016). Literature survey on the economic impact of TTIP, CPB Netherlands Bureau of Economic Policy Analysis 2016; 2508 GM The Hague.
- [4] Bergkamp, L. and Kogan, L.A. Trade, the Precautionary Principle, and Post-Modern Regulatory Process: Regulatory Convergence in the Transatlantic Trade and Investment Partnership. In *European Journal of Risk Regulation* 2013; pp. 493-507.
- [5] Bonciu, F. I. Transatlantic Economic Relations and the Prospects of a New Partnership. In *Romanian Journal of European Affairs*, 2013; Vol. 13, N03.
- [6] Costinot, A. and A. Rodríguez-Clare. Trade Theory with Numbers: Quantifying the Consequences of Globalization, in *Handbook of International Economics*, ed. By G. Gopinath, E. Helpman, and K. Rogoff, North Holland, 2013; vol. 4. 41
- [7] Caliendo, L. and F. Parro. Estimates of the Trade and Welfare Effects of NAFTA, *Review of Economic Studies*, 2015; 82(1): 1–44.
- [8] Delegation of the European Union to the United States. The EU-U.S. trade relationship is already the biggest in the world, and delivers enormous, 2013; <http://ec.europa.eu/trade/policy/in-focus/ttip> accessed May 2015.
- [9] Egger, P., J. Francois, M. Manchin, and D. Nelson. Non-tariff Barriers, Integration, and the Transatlantic Economy, *Economic Policy*, 2015; 30(83): 539–584.
- [10] Felbermayr, G., B. Heid, M. Larch, and E. Yalcin. Macroeconomic Potentials of Transatlantic Free Trade: A High Resolution Perspective for Europe and the World, *Economic Policy*, 2015; 30(83): 491–537.
- [11] Goldstein, M. and M. Moshkin Khan. The Supply and Demand for Exports: A Simultaneous Approach. *Review of Economics and Statistics*. February 1978; 275-286.
- [12] International Monetary Fund, *International Financial Statistics*, various Issues.
- [13] Karemera, D. and W. Koo. Trade Creation and Diversion Effects of the U.S.-Canadian Free Trade Agreement. *Contemporary Economic Policy*, January 1994; Vol. XII, 12-23.
- [14] Karemera, D., Whitesides, L., and Smalls, G. Trade Creation and Diversion Effects of Selected Bilateral and Regional Free Trade Agreements and Exchange Rate Volatility in the Global Meat Trade, *Journal of Economic Integration*, June 2015; Vol.30 No.2, pp 276–304.
- [15] Koo, W. W., I. H. Uhm, and J. Golz. Bilateral Trade Relationship Between the United States and Canada: Implications of Free Trade Agreement. *Contemporary Policy Issues*. October 1991; 56-69.
- [16] Lester, S. and I. Barbee, I. The Challenge of Cooperation: Regulatory Trade Barriers in the Transatlantic Trade and Investment Partnership. In *Oxford Journals Economics & Law Journal of International Economic Law*. 2013; Vol. 16 Issue 4Pp. 847-867.
- [17] Tracy Murray and Peter J. Ginman. An Empirical Examination of the Traditional Aggregate Import Demand Model, *The Review of Economics and Statistics*, 1976; Vol. 58, No. 1 pp. 75-80
- [18] Pomfret, R. MFN Tariff reductions and Developing Country Trade Benefits Under GSP: A Comment. *The Economic Journal*, July 1986; 534-536.
- [19] Sawyer, W. C. and Sprinkle R. L. Alternative Empirical Estimates of Trade Creation and Trade Diversion: A Comparison of the Baldwin-Murray and Verdoorn Models. *Weltwirtschaftliches Archive* 1989; 18-26.
- [20] Verdoorn, P. J. and Bochove, C.A V. Measuring Integration Effects: A Survey. *Economic Review*. March 1972; 237-49.
- [21] Wonnacott, R. and P. Wonnacott, P. Free Trade Between United States and Canada: 15 Years Later, *Canadian Public Policy Supplement*, October 1982.
- [22] Wróbel, A. Multilateralism or Bilateralism: The EU Trade Policy in an Age of the WTO Crisis, in *Ekonomika / Economics*. 2013; Vol. 92 Issue 3, pp7-23. 17.
- [23] Wylie, P. J. Partial Equilibrium Estimates of Manufacturing Trade Creation and Diversion Due to NAFTA, *North American Journal of Economics and Finance*, 1995; 6 (1), 65-84.
- [24] Yamazawa, I. On Pacific Economic Integration. *The Economic Journal* 102, 1995; pp. 1519-1529.
- [25] Zellner, A. An Efficient method of estimation Seemingly Unrelated Regression and Tests of Aggregation Needs. *Journal of American Statistical Association*. June 1962; 348-68.