Who Benefits from the Transatlantic Trade and Investment Partnership? A Quantitative General Equilibrium Analysis with Poisson Pseudo Maximum Likelihood

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Abstract

The public criticism and skepticism, particularly within the Eurozone, centered on the belief that the United States would be the primary beneficiary of the Transatlantic Trade and Investment Partnership (TTIP), ultimately contributed to the agreement's decline. This raises an important question: Who would have truly benefited from the TTIP? To answer this question, this study employs a general equilibrium (GE) with a poisson pseudo-maximum likelihood (PPML) model to simulate and evaluate the ex-ante counterfactual welfare effect of an hypothetical TTIP on member countries as well as on non-member countries, aiming to identify the beneficiaries. The empirical findings reveal that integration between the US and the EU through the TTIP leads to a significant enhancement in the economic welfare of all EU countries ranging from 0.33% to 1.9%. Conversely, the welfare of the US (-0.131%) and non-member countries experiences a decline. While all members of the North American Free Trade Agreement (NAFTA), including the US, witness improvements in consumer prices, the US faces reductions in producer prices despite achieving the highest export growth of 24% as compared to the other member countries. The findings in this paper confirms the results from the textbook intuition that small countries gain more than big countries from trade liberalization.

JEL Classification Codes: F12; F13; F14
Keywords: TTIP; general equilibrium; counterfactual; economic welfare; structural gravity model

NB: Hi Dr. Frank Ciarliero, in light of the impending submission deadline. I've opted to present my work in a format resembling a paper intended for publication. However, I intend to enhance the content by incorporating additional literature reviews and conducting further counterfactual analyses to enrich and add more to the discussion section. These enhancements are planned for future research, where I aim to introduce sectoral heterogeneity in production to quantify trade and welfare effects on both member and non-member countries. I kindly request your understanding regarding any grammatical errors or typos that may be encountered, as I remain committed to ongoing improvements in subsequent revisions. I wholeheartedly welcome your suggestions and criticisms, as this is a newly initiated project I have undertaken for your class as my term paper. Wishing you a holiday filled with blessings!

1 Introduction

The Transatlantic Trade and Investment Partnership (TTIP) was a proposed bilateral trade and investment agreement between the United States and the European Union (EU), aiming to foster trade and economic growth. The primary objectives were to enhance trade conditions, lower tariffs, and reduce barriers between the EU and the United States, ultimately bolstering their respective economies. These two partners collectively accounted for over 50% of the world's GDP,

more than 30% of global goods trade, over 40% of global services trade, and comprised 11.8% of the world's population (Anderson et al., 2016). Supporters of the TTIP anticipated mutual benefits for both economies through increased trade facilitated by reduced cross-border trade costs. A 2014 publication by the government of the United Kingdom[1] argued that TTIP would simplify access for EU businesses to a market of over 300 million American consumers, resulting in cost savings. Additionally, proponents contended that the agreement would widen consumer product choices, lower trade expenses, contribute to cheaper goods, and create job opportunities, ultimately raising wages. However, critics[2] of the TTIP contended that the agreement would mainly benefit large corporations, while raising alarms in Europe about a possible influx of American products of lower quality, owing to diminished trade barriers. Additionally, these critics minimized the projected advantages of the deal, voicing fears over a potential compromise in health, safety, labor, and environmental regulations—a scenario often referred to as a 'race to the bottom'. In the European context, there was intense discussion over the possibility of the EU having to loosen its rigorous standards, particularly concerning the importation of genetically modified foods, which are currently heavily regulated. Furthermore, there were serious concerns that the TTIP could weaken the established consumer protection norms in both the EU and the US. The lack of transparency in the negotiation process fueled controversy, and some countries perceived the TTIP as non-transparent. Despite initial billing as the largest-ever trade agreement, negotiations concluded in 2016 without reaching an agreement. The Council of Europe, on April 15, 2019, announced that should there be any attempt to reinitiate trade discussions related to TTIP, it would be imperative to commence negotiations anew[3]. This implies that there remains a potential possibility of rekindling negotiations in the future. In order to shed light on which countries truly reap the advantages of TTIP and to alleviate public skepticism, particularly among those within the Eurozone who question the beneficiaries of TTIP, this study will employ a quantitative approach and simulate it on an hypothetical TTIP. It will systematically assess the beneficiaries using the General Equilibrium Poisson Pseudo-Maximum Likelihood (GEPPML) procedure, encompassing a dataset of 122 countries, which includes the European Union (EU), the United States (USA), as well as selected countries from various regions and continents worldwide (refer to the data section 3.5 for comprehensive details).

In addition to the public discourse regarding the pros and cons of the TTIP, leading to its obsolescence, there has been a significant debate both in public and scholarly circles that the quantitative analysis of the agreement's effects has predominantly concentrated on its impact on the USA and the more developed EU economies. Conversely, there has been limited, if any, exploration of the impact of TTIP on less developed European countries and other non-European nations. To address this gap, the primary objective of this paper is to provide an ex-ante, in-depth exploration how an initial trade liberalization shock, such as the formation of TTIP, will influence consumers prices or importers, producers prices or exporters, export volumes, and total welfare in both member countries and outsider nations, being it developed or developing economy.The findings aim to assist policymakers in making informed decisions on whether to reconsider the TTIP in the future or not.

Surprisingly, I came across only two papers (Anderson et al., 2016; De Ville and Siles-Brügge, 2014) directly connected to this research. First, Anderson et al. (2016) investigated the TTIP and its growth effects using the dynamic structural gravity model with PPML where their

[1] https://www.gov.uk/government/news/transatlantic-trade-and-investment-partnership-ttip-benefits-and-concerns

[2] https://www.theguardian.com/business/2015/aug/03/ttip-what-why-angry-transatlantic-trade-investment-partnership-guide

[3] https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/making-trade-policy_en

research focus was on TTIP's growth effect through capital accumulation. Secondly, De Ville and Siles-Brügge (2014) employed the Computable General Equilibrium (CGE) approach to explore the role of the Transatlantic Trade and Investment Partnership in managing fictional expectations. However, the complexity of the CGE within the GTAP (Global Trade Analysis Project) model presents challenges, particularly its inability to impose strong assumptions on the functional form of the relationship between different aggregates or the value of the parameters (Fofack et al., 2021). In contrast, this study will evaluate the quantitative impact of the TTIP by simulating it through a static structural framework of the gravity model. This approach is simpler yet more tractable, incorporating the General Equilibrium PPLM (GEPPML), which captures observed and unobserved variables with country pair-specific fixed effects, ensuring an exceptionally high level of goodness-of-fit. GEPPML leverages extensive research and debate on the optimal econometric approach to estimate the relationship between trade costs and bilateral trade. Moreover, it quantifies the effect of policy intervention, a feature absents in ex-post econometric studies. It is noteworthy that, when correctly specified, GEPPML as a tool for policy experiments yields results comparable to CGEs and Exact-hat Algebra (Bekkers, 2019).

This paper employs the General Equilibrium Poisson Pseudo Maximum Likelihood (GEPPML) method, building upon the work of Anderson et al. (2018), to anticipate the potential impacts of the TTIP on member and non-member countries. This method leverages the properties of structural gravity and PPML to analyze various consequences of a counterfactual policy scenario against a baseline scenario. The process involves three stages: First stage, estimate the elasticity of bilateral trade to trade costs and use it to estimate trade costs for each trading pair. Second Stage, estimate hypothetical trade costs associated with the formation of TTIP and using them to estimate counterfactual trade flows. Then, evaluate the change in bilateral trade flows due to TTIP while considering alterations in Multilateral Resistance Terms (MRTs) including both the Inward Multilateral Resistance (IMR) and the Outward Multilateral Resistance (OMR), while maintaining constant expenditure and output values, termed as "the conditional general equilibrium". The third stage relaxes the constant income and expenditure assumption and utilizes estimates from the first and second stages to assess the repercussions on trade and welfare in the "full endowment general equilibrium" scenario by considering fixed factor endowments.

The rest of this paper is organized as follows: Section 2 discusses the theoretical framework of the structural gravity model. Section 3 describes the empirical framework or methodology of the paper including the various stages of the GEPPML estimation procedure and data description with a summary statistics. Section 4 discusses the results. Discussion is done in Section 5, and section 6 conclude by highlighting the study's limitations and suggesting potential avenues for future research.

2 Theoretical Framework

The GEPPML procedure represents an empirical application within the gravity model, considered the standard framework for scrutinizing trade policy. Gravity models originated from an empirical observation of trade flows, positing that trade between two countries is proportional to the product of their Gross Domestic Product (GDP) and inversely proportional to the distance between them. Subsequent studies provided theoretical foundations for this observation, drawing inspiration from frameworks such as Armington (1969) and Anderson (1979)(Constant Elasticity of Substitution(CES)). Anderson and Van Wincoop (2003) introduced the concept that, beyond size and proximity, gravity models should incorporate region's relationships with

third parties (Anderson and Van Wincoop, 2004). These models, often termed "structural" gravity, have undergone various iterations in the literature (Head and Mayer, 2014). Each imposes distinct conditions on consumers or producers, yielding different interpretations of parameters, yet they converge on common expressions for the equilibrium value of bilateral exports X_{ij} to location (destination region) j from geographical location (origin) i;

$$X_{ij} = \left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma} Y_i E_j \tag{1}$$

Where

$$P_j^{1-\sigma} = \sum_i \left(\frac{t_{ij}}{\Pi_i}\right)^{1-\sigma} Y_i \tag{2}$$

and

$$\Pi_i^{1-\sigma} = \sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} E_j \tag{3}$$

The variable $Y_i (= \sum_j X_{ij})$ is the region of origin $i's$ total output and $E_j (= \sum_i X_{ij})$ is the region of destination $j's$ total expenditure on goods and services. $t_{ij} > 1$ is the trade cost between i and j, and $\sigma > 1$ is the elasticity of substitution across varieties, and $1-\sigma$ is the trade cost elasticity calculated as $1 - \sigma = \frac{\partial ln X_{ij}}{\partial ln t_{ij}} > 0$. P_j represents the inward multilateral resistance (IMR), amalgamating the impact of trade costs on consumers in each country and serving as the CES price index of the demand system. On the other hand, Π_i signifies the outward multilateral resistance (OMR), which, as per equation 3, consolidates country $i's$ outward trade costs concerning destination price indexes. Multilateral resistance, a conditional general equilibrium concept, is determined by the solution of equation 2 and 3 for the given Y_i, E_j.

Within the Armington framework, the producer prices can be derived from the overall CES demand for the unique good of region i. The demand for this particular good in region j is expressed as: $X_{ij}^* = \left(\frac{\gamma_i p_i t_{ij}}{P_j}\right)^{1-\sigma} E_j$ where $\gamma_i > 0$ is the CES share parameter. From equation 2,, equation 3, and X_{ij}^*. I solved for the exporter's/producer's prices (also known as factory gate prices) as:

$$p_i = \frac{Y_i^{\frac{1}{\sigma-1}}}{\gamma_i \Pi_i} \tag{4}$$

Where equation 4 is obtained from the market clearing condition for region $i's$ output expressed as:

$$Y_i = \sum_j X_{ij} = (\gamma_i p_i)^{1-\sigma} \sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} E_j \tag{5}$$

Considering 1, a decrease in trade costs resulting from signing a regional trade agreement(RTA) leads to increased trade between the countries involved when assumed that the elasticity of substitution between product varieties is greater than 1. In a scenario of conditional general equilibrium, changes in trade costs affect the terms of trade between countries through MRT

values, assuming fixed output and expenditure levels. Higher MRTs indicate higher trade barriers, making it more challenging for countries to access the global market, pushing them to trade more with each other. Another alternate interpretation is that each importing country allocates a portion of its expenditure, and each exporting country allocates a portion of its production to all world countries based on trade costs and weighted prices faced by both importers and exporters - MRTs (Head and Mayer, 2014). When countries enter into free trade agreement (FTA's) like TTIP, their MRTs decrease, improving market access for both countries. This weakens the direct impact of the FTA on their bilateral trade. The effect of this counterweight is more pronounced when the partner country is larger, but it is never strong enough to change the direction of the effect (Yotov et al., 2016). For non-member countries, their MRTs increase because they become more isolated compared to member countries, leading to increased trade among them. The impact of an RTA on the MRTs of both member and non-member countries is stronger when the partner countries are larger. The TTIP is considered a network of FTAs since it aimed to reduce regulatory trade barriers among member countries that signed the agreement. This implies that the conditional general equilibrium feedback can go either way, depending on a country's membership in a larger RTA and its size.

3 Empirical Framework

Gravity models in economics are recommended to be estimated while incorporating fixed effects for both importers and exporters (IMR and OMR respectively), as suggested by Feenstra (2002), a recommendation that has been widely followed in subsequent research. Furthermore, many recent studies adhere to the guidance of Silva and Tenreyro (2006), who advocate for the poisson pseudo maximum likelihood estimator in gravity regressions. This choice helps address issues of heteroscedasticity and allows for the inclusion of information from zero trade flows. In this paper, we employ the general equilibrium poisson pseudo maximum likelihood method to quantify the impacts of the TTIP on both member and non-member countries, following the approach outlined by Anderson et al. (2018). The TTIP serves as the policy intervention in my analysis, representing an ex-ante RTA. This analytical process involves three key stages: In the first stage, estimate the baseline effect of the RTA on trade cost variables. The second stage builds upon the first-stage results to estimate baseline and counterfactual trade flows while considering the feedback effects within the conditional general equilibrium framework. The third stage utilizes the estimates from the previous stages to calculate changes in factory gate prices and employs them to assess the overall general equilibrium effects on welfare and trade. Taking these considerations into account, many recent studies employ the empirical gravity model version outlined below:

$$X_{ij} = \exp(\mathbf{T}_{ij}\boldsymbol{\beta} + \pi_i + \chi_j) \times \epsilon_{ij} \tag{6}$$

From the reduced form equation 6, $\mathbf{T}$ represents a vector of trade cost variables, $\boldsymbol{\beta}$ is a vector of coefficients, and ϵ_{ij} is an error term that is assumed to be independent of the regressors, with a conditional expectation equal to one. Additionally, π_i represents exporter fixed effects, which account for outward multilateral resistances and sales/outputs, while χ_j represents importer fixed effects, which account for expenditures and inward multilateral resistances. To avoid the issue of perfect collinearity, one importer or exporter fixed effect had to be dropped; thus, I chose to drop one importer fixed effect, χ_0 (which happened to be Germany in my sample as suggested by literature), and the constant term. This means that all other fixed effects are identified

relative to χ_0. Furthermore, to solve the system, we need to normalize one of the multilateral resistances, and we choose to normalize the resistance corresponding to the dropped importer fixed effect, setting it to $\widetilde{P}_0 = 1$. With $\widetilde{P}_0 = 1$, the theoretical interpretation of the importer fixed effect $\widetilde{\chi}_0$ is E_0, but since it is dropped from the model, we set $\widetilde{\chi}_0 = 0$. Therefore, the theoretical interpretation of all other fixed effects is relative to E_0. Fally (2015) has demonstrated that the PPML estimates of the fixed effects in gravity estimations are perfectly consistent with the structural gravity terms. This consistency allows us to recover the Outward Multilateral Resistances (OMRs) and Inward Multilateral Resistances (IMRs) from the fixed effects in the following:

$$\widetilde{\Pi_i^{1-\sigma}} = E_0 Y_i \exp(-\widetilde{\pi}_i) \tag{7}$$

$$\widetilde{P_j^{1-\sigma}} = \frac{E_j}{E_0} \exp(-\widetilde{\chi}_j) \tag{8}$$

where π_i and χ_j are the estimated fixed effects from Equation (6) representing outward multilateral resistances (OMRs) and inward multilateral resistances (IMRs) respectively, and Y_i, E_j, and E_0 are given in the data. I obtain the corresponding proper IMRs and OMRs due to the PPML properties. I will exploit the full structure of the system's equations (1)–(4) in order to develop our general equilibrium poisson pseudo-maximum likelihood (GEPPML) procedures or stages.

3.1 GEPPML: Stage 1

Let's refer to the initial stage as the 'Baseline Scenario Stage' because it yields the foundational estimates for the analysis. In this stage, my goal is to ascertain the fixed effects for importers (IMR) and exporters (OMR), as outlined in Equation 6. I estimate the fixed effects with PPML and use them to construct baseline indexes for Π_i and P_j (baseline multilateral resistances). Even though Anderson et al. (2018) pointed out that, it is unnecessary to use PPML in the first stage; instead, any econometric approach that provides an adequate estimate of the fixed effect are welcome. But some of these other econometric approaches may not be able address some major problems in trade analysis. For instance, trade datasets frequently include zero trade flows, which can skew results if not properly accounted for. Second, an atheoretical representation of the gravity equation is likely to yield biased estimators due to the omission of relevant variables and the negligence of key mechanisms correlated with the error term, such as MRTs and self-selection into RTAs. Trade matrices generally contain many zero observations; log-transforming the dependent variable and using Ordinary Least Squares (OLS) entails a loss of zero observations. This method is problematic because the zeroes are not distributed randomly; there are economic reasons for why some pairs do not trade with each other, and they are likely correlated with the right-hand side variable in question. Approaches like the Tobit model have been introduced to manage the truncation of zero trade flows, and the Heckman selection model has been suggested to correct for selection bias. However, they were criticized for their vulnerability to heteroskedasticity and the difficulty in finding adequate instrumental variables satisfying the exclusion restriction, respectively (Kareem and Kareem, 2014). I chose PPML as the preferred estimator in this stage for consistency with the rest of the procedure and due to its appealing properties for gravity estimations (Silva and Tenreyro, 2006, 2011).

3.2 GEPPML: Stage 2

Let's call this stage "conditional" scenario, where I introduce the TTIP as a counterfactual into the model. The stage delivers the "conditional" gravity estimates and Conditional GE indexes, which allow for changes in the IMRs and OMRs in response to changes in trade costs, but **do not take output and expenditure changes into account**. Introduce the policy variable(s) of interest to estimate counterfactual trade flows relative to the baseline scenario using PPML estimate. 6 now changed to:

$$X_{ij} = \exp(\mathbf{T}_{ij}^{c}\boldsymbol{\beta}^{c} + \pi_{i}^{c} + \chi_{j}^{c}) \times \epsilon_{ij}^{c} \tag{9}$$

Here, $\mathbf{T}_{ij}^{c}$ is the vector of counterfactual trade policy covariates. $\boldsymbol{\beta}^{c}$ indicates the fact that the trade cost coefficients are constrained to the estimated values from the baseline specification; and the superscript c denotes counterfactual variables. All other variables remain the same as in the baseline model at stage 1. The differences, in percentage, between the baseline indexes in stage 1 and the counterfactual indexes in this stage measure the "Conditional" GE effects of the simulated trade policy. The percentage change in welfare in the "Conditional" GE scenario can be calculated by the change in real GDP, that is calculated as:

$$\hat{W}_{i} = \frac{Y_{i}^{c}/\tilde{P}_{i}^{c}}{Y_{i}/\tilde{P}_{i}} = \frac{\tilde{P}_{i}}{\tilde{P}_{i}^{c}}, \forall i, \tag{10}$$

In this paper, I construct real GDP as a measure of welfare with the standard value for the elasticity of substitution, $\sigma = 7$. In summary, in this stage, I impose the counterfactual (TTIP), then re-estimate the baseline from stage 1, and use the fixed effects to calculate "conditional" general equilibrium (GE) indexes.

3.3 GEPPML: Stage 3

This stage is called the "Full Endowment" scenario. It generate gravity estimates and "Full Endowment" GE indexes, which in addition to changes in the IMRs and OMRs capture **changes in output and expenditure**. It account for endogenous response in the value of outputs/incomes and expenditures in an endowment economy where trade imbalance ratios given as $\omega_{i} = E_{i}/Y_{i}$ are assumed to stay constant in the counterfactual for each country i. The changes in output/income and expenditure will trigger additional changes in multilateral resistance (MR) terms and so forth, which will translate the changes in output and expenditure, triggering additional changes in factory-gate prices, into changes in trade flows. New IMR and OMR are obtained as functions of the estimates of the fixed effects and of the new values of income and expenditure.This changes in the OMR is reflected in the prices at equation 4 as the producer's prices instead of the OMR. Thus, under the full employment scenario, we use p_{i} instead of the OMR for the analysis.I construct "Full Endowment" GE indexes based on the new fixed effect figures and the differences, in percentage, between the baseline indexes and the counterfactual "Full Endowment" GE indexes from this stage measure the "Full Endowment" GE effects of the simulated trade policy. The percentage change in welfare in the "Full Endowment" GE scenario can again be calculated by the change in real GDP relative to the baseline, that is calculated as:

$$\hat{W}_i = \frac{\tilde{Y}_i^c / \tilde{P}_i^c}{Y_i / \tilde{P}_i}, \forall i, \tag{11}$$

With constant shares of trade imbalances, the change in output and expenditures are identical for each country. Hence, real GDP changes correspond to changes in real expenditures. This precedure is termed as the "estibration' methodology".

3.4 Counterfactual Analysis: A world with TTIP

In this section, I focus on a hypothetical scenario where I introduced the TTIP to the model. Assuming the TTIP had been enacted by the United States and the European Union, we explore its potential effects on both member and non-member nations. As described in the GEPPML stages, I start with a counterfactual analysis that is based on a vector of estimated bilateral trade costs from the baseline empirical gravity specification in equation 6. Then I introduce the TTIP as the counterfactual variable in stage 2 obtain Conditional GE estimates using equation 9 where the trade cost coefficients are constrained to the estimated values from the baseline specification with the assumption that output, and expenditure changes are constant. Finally, we follow stage 3 to obtain estimates and GE indexes of the Full Endowment GE effects through the introduction of the TTIP with an assumption that output, and expenditure changes are not constant by suppressing the trade cost coefficients in the baseline specification. If the TTIP between the United States and the European Union had been successfully negotiated and implemented, it had the potential to establish one of the world's largest free trade areas. For the United States, the TTIP was poised to stimulate growth in the service sector and advanced manufacturing, providing increased market access in Europe. Additionally, it could have resulted in more efficient regulatory frameworks, lowered costs for both consumers and businesses, and expanded employment opportunities in export-oriented industries. The European Union stood to benefit from the TTIP by boosting the competitiveness of its automobile and pharmaceutical sectors, streamlining access to the U.S. market. Furthermore, the agreement had the potential to foster innovation through increased collaboration and potentially boost GDP by reducing trade barriers. However, non-member countries might have faced challenges, as their exports to both the U.S. and EU could have become less competitive compared to goods originating within the TTIP zone, potentially leading to trade diversion.

3.5 Data

I obtain data on bilateral exports from the IMF website, Direction of Trade Statistics (DOTS). The database reports the value of merchandise exports which are disaggregated across each country's trading partner. Exports are reported on a "Free On-Board". The DOTS report annual data of more than 200 countries and independent territories from 1947 to 2022. My data contain 53 African countries with the exception of South Sudan and 69 countries from the rest of the 5 continents resulting to 122 countries. Within the context of investigating the hypothetical effect of the Transatlantic Trade and Investment Partnership (TTIP), the member countries are 28 including the 27 countries in the EU and the US and 94 non-member countries from all continents. Apparent consumption is used to measure internal trade flows which subtract total exports of each country from total production (GDP). Because of the presence of internal

trade flows, each of the 122 countries has 122 trade partners. Therefore, the total number of observations in my data is $122 \times 122 = 14{,}884$. My sample of 122 countries is a highly representative sample of the population because their combined GDP is over 95% of the world's GDP and accounting for over 90% of the world's trade flows in 2020. Data on the bilateral trade costs (ideally gravity variables) such as, geographical distance, contiguous borders, common language, and colonial ties are obtained from the Research and Expertise on the World Economy (CEPII) website, Geographical Distances database. The international distance between the pair of countries is measured as the simple straight-line distance between the most populous cities of the countries in kilometers while internal distance is measured by taking the simple straight-line distance between the two most populous cities in the country in kilometers. Contiguous border is a dummy variable which is equal to one when the pair share a contiguous border or are adjacent and zero otherwise. Common official language is a dummy variable which is equal to one when the pair speak the same official language and zero otherwise. Colonial tie is a dummy variable which is equal to one when the pair have a colonial history and zero otherwise. International border is a dummy which is equal to one when the exporter and the importer pair are different and zero when they are the same. I obtain data on the FTAs specifically, EU and NAFTA that enter my model from the WTO website, RTA database. The database contains information on all 356 RTAs in force. FTAs are dummies which are equal to one when there is a trade agreement between the pair of countries and zero otherwise. Finally, data on GDP are obtained from the World Bank database. GDP which is a proxy for production is used to construct the internal trade flows which I previously described under the paragraph one of the data section. A summary of the countries and their abbreviation used in the work is summarized in the appendix of this work. Moreover, a summary statistic of the full sample, member country sample, and a sub-sample of positive trade flows is found in the appendix.Table 1 below presents the summary statistics for the variables included in the dataset.

Table 1: Summary statistics of the data

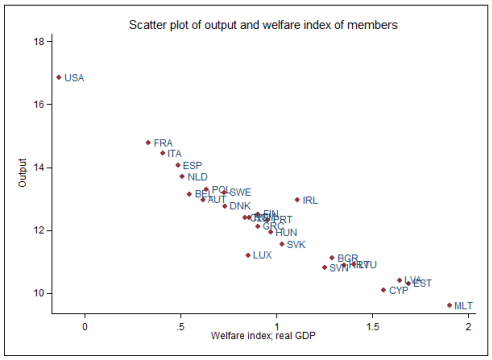
	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample		Trade flows > 0		EU & US sample	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Trade	5454.432	197534.9	6700.541	218922.1	4716.701	13076.51
Log of distance	8.566	0.84	8.542	0.887	7.133	0.732
Contiguity	0.026	0.158	0.03	0.171	0.096	0.295
Common language	0.17	0.376	0.171	0.377	0.036	0.186
Colonial tie	0.016	0.124	0.019	0.137	0.027	0.164
EU	0.048	0.216	0.06	0.238	---	---
NAFTA	0.001	0.025	0.001	0.027	---	---
Number of observations	14,884	14,884	12,116	12,116	729	729

4 Results

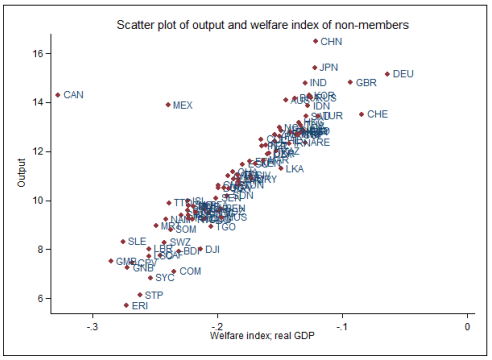
Table 2: GE effect of a hypothetical trade integration between US and EU: member countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Endowment GE Indexes					Conditional GE Indexes			
Country	IMR	OMR	Welfare	Exports	Price	IMR	OMR	Welfare	Exports
AUT	−0.186	−0.499	0.618	2.763	0.430	−0.072	−0.438	0.072	2.658
BEL	−0.149	−0.463	0.548	1.866	0.398	−0.046	−0.406	0.046	1.807
BGR	−0.583	−0.812	1.292	2.909	0.702	−0.435	−0.706	0.437	2.723
CYP	−0.782	−0.887	1.561	4.094	0.767	−0.627	−0.770	0.631	3.841
CZE	−0.252	−0.675	0.837	2.689	0.583	−0.114	−0.589	0.114	2.556
DNK	−0.226	−0.585	0.731	4.507	0.504	−0.096	−0.511	0.096	4.318
ESP	−0.139	−0.404	0.487	5.912	0.348	−0.034	−0.356	0.034	5.722
EST	−0.766	−1.051	1.689	2.707	0.910	−0.591	−0.911	0.594	2.488
FIN	−0.342	−0.649	0.905	4.292	0.559	−0.205	−0.566	0.206	4.095
FRA	−0.086	−0.288	0.334	4.032	0.248	−0.005	−0.256	0.005	3.915
GRC	−0.436	−0.538	0.903	5.449	0.464	−0.321	−0.471	0.322	5.211
HRV	−0.609	−0.851	1.352	3.285	0.735	−0.450	−0.739	0.452	3.103
HUN	−0.356	−0.708	0.971	3.143	0.611	−0.211	−0.617	0.211	2.990
IRL	−0.194	−1.056	1.111	5.458	0.914	0.019	−0.915	−0.019	5.160
ITA	−0.047	−0.420	0.408	5.114	0.361	0.065	−0.369	−0.065	4.938
LTU	−0.592	−0.927	1.402	2.57	0.801	−0.430	−0.804	0.432	2.380
LUX	−0.358	−0.571	0.853	1.446	0.492	−0.248	−0.499	0.249	1.375
LVA	−0.741	−1.026	1.641	2.594	0.888	−0.569	−0.889	0.573	2.381
MLT	−1.077	−0.931	1.902	6.525	0.805	−0.909	−0.808	0.918	6.236
NLD	−0.065	−0.517	0.511	3.508	0.445	0.058	−0.453	−0.058	3.365
POL	−0.210	−0.494	0.636	4.264	0.426	−0.096	−0.433	0.096	4.080
PRT	−0.402	−0.638	0.956	5.953	0.550	−0.262	−0.557	0.263	5.743
ROM	−0.371	−0.561	0.857	5.166	0.483	−0.248	−0.490	0.248	4.947
SVK	−0.373	−0.755	1.029	2.322	0.651	−0.223	−0.656	0.224	2.202
SVN	−0.494	−0.869	1.252	1.935	0.751	−0.334	−0.755	0.335	1.818
SWE	−0.224	−0.584	0.729	5.381	0.504	−0.089	−0.510	0.089	5.164
USA	-0.927	1.247	-0.131	24.169	-1.057	-1.256	1.059	1.272	23.832
DEU	0.000	0.074	−0.064	−0.811	−0.064	0.000	0.054	0.000	−0.816

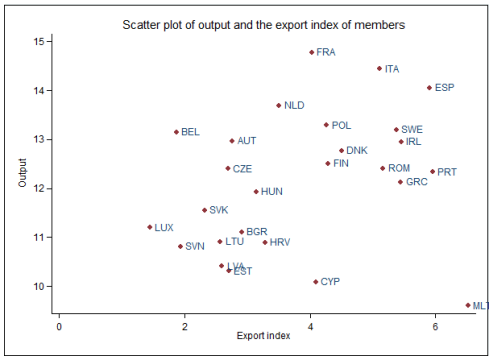
Notes: This table reports the general equilibrium effect of a hypothetical trade integration between the US and the EU for only the member countries. Column (1) to column (5) report the Full Endowment general equilibrium indexes and column (6) to column (9) report the Conditional general equilibrium indexes. Columns (1) and (6) report the percentage changes of the IMR index, columns (2) and (7) report the percentage changes in the OMR index, columns (3) and (8) report the percentage changes in the real GDP index, i.e., the welfare index, columns (4) and (9) report the percentage changes in the exports index, and column (5) reports the percentage change in the factory-gate prices, producer price.



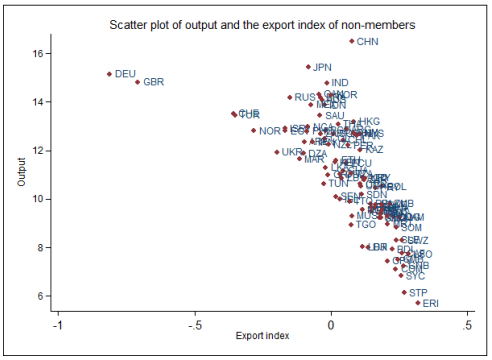
(Welfare for Members)



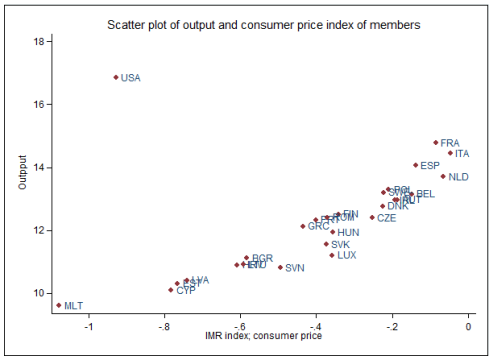
(Welfare for Non-Members)



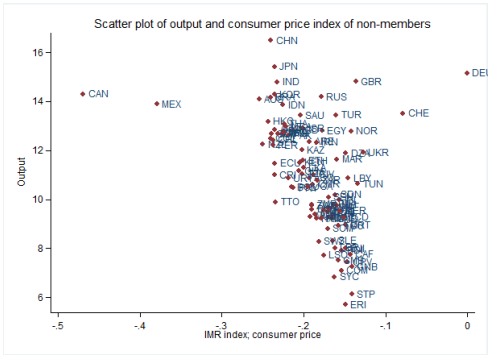
(a) Export Index for Members



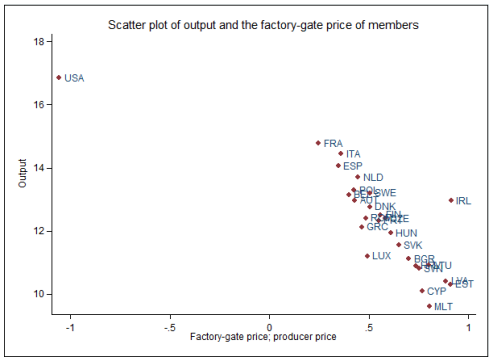
(b) Export Index for Non-Members



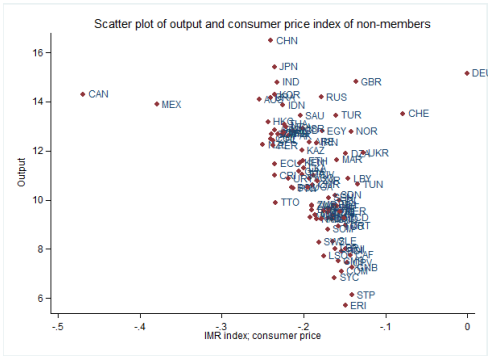
(c) Consumer Prices for Members



(d) Consumer Prices for Non-Members



(e) Producer's Prices for Members



(f) Producer's Prices for Non-Members

Figure 1: Full Endowment General Equilibrium Indexes

5 Discussions

By comparing the results of both the conditional GE indexes and the full endowment GE indexes using the signs (+ or -) for IMR (Inward Multilateral Resistance), OMR (Outward Multilateral Resistance), Welfare and Export, we observed a consistent pattern in Table 2, with the exception of Ireland (IRL), Italy (ITA), and the Netherlands (NLD). These three countries exhibited negative values in the conditional GE indexes. Consequently, the focus will be directed towards discussing the results presented in Table 2 and Table 3 found in the appendix - Table 3, with a specific emphasis on the full endowment GE section. It is noteworthy that the full endowment GE model considers variations in output and expenditure in contrast to the conditional GE model which assumed it to be constant.

The countries featured in Table 2 are members of the TTIP (Transatlantic Trade and Investment Partnership), while non-member countries can be found in the appendix table. It is important to mention that the reference country used in this analysis is Germany (DEU), as recommended by existing literature, therefor any interpretation of the results is done using Germany as the base country . The results reveal that there was a positive improvement in the welfare of all member countries, ranging from a 0.33% increase in welfare for France (FRA) to a substantial 1.9% increase for Malta (MLT). Interestingly, the United States (USA) experienced a slight decline in welfare by 0.13% (as depicted in Figure 1 below), despite exhibiting a positive welfare value of 1.27 in the conditional GE indexes. This finding aligns with the theoretical prediction that, following trade liberalization, smaller countries tend to benefit more than larger ones. Consequently, the major beneficiaries of the TTIP appear to be the various European economies in terms of welfare.

In terms of the consumer price index (Inward Multilateral Resistance – IMR, the more the negative, the better), the findings indicate that the introduction of the TTIP would benefit by reducing the costs for consumers for all the member countries and non-member countries. The member country that gains most for their importers is Malta (-1.77%) and the US (-0.927) whereas France, Italy and Netherland importers suffer the most. For the non-member country, importers from Canada, Mexico (NAFTA), China, Japan, Indians benefit substantially from the TTIP (see figure 1).

Also, in the full endowment GE scenario, It was found that all the producers or exporters of the policy members increase as OMRs falls at an increasing producer prices (factory gate price) ranging from 0.3% (Belgium) to 0.95%(Spain) whiles the US producer's price decline (-1.05%). Producers from Mexico, Canada, China, Japan, Indian all experience decline in their production prices. I observed that for the member countries, the volume of export for all the members went up including the US whose exporting volume grew to 24% followed by Malta (6.52%), Portugal (5.95%) and Spain (5.91%). This shows that US export volume increase to 24% and consumers are paying for prices at a reduce cost yet the economic welfare of US decline. This must be as a inefficiency in production in the USA.

6 Conclusion

This paper aimed to assess and measure the hypothetical impact of the Transatlantic Trade and Investment Partnership (TTIP) on both member and non-member countries. It sought to identify the beneficiaries by utilizing a general equilibrium approach with a Poisson pseudo-maximum likelihood estimation method, using data from 123 countries and applying a static structural framework based on Anderson et al.'s 2018 model to quantify the effects of TTIP on both member and non-member nations.

The primary findings of this study indicate that the integration between the United States and the European Union through the TTIP leads to a substantial improvement in the economic welfare of all EU countries, with gains ranging from 0.33% to 1.9%. In contrast, the welfare of the United States and non-member countries experiences a decline. While all members of the North American Free Trade Agreement (NAFTA), including the United States, witness improvements in consumer prices, it is noteworthy that the United States experiences a decrease in producer prices, despite achieving the highest export volume growth of 24%.

Limitation and Extension

In this paper, I've utilized cross-sectional data from 2020, making it challenging to assess welfare gains over different time periods. Consequently, future studies should consider expanding the timeframe to incorporate panel data analysis. While my analysis has been centered around the application of a static structural gravity model, there is a clear need for future research to employ dynamic models for a more comprehensive understanding of the subject. Additionally, upcoming research endeavors could explore sectoral heterogeneity in production to quantify both trade and welfare effects, including the intricate input-output linkages within policy analysis—a direction I intend to pursue in future studies.

Although it would have been valuable to delve deeper into the ongoing political discourse surrounding the agreement, with its proponents and opponents, such an exploration is perhaps more suited for a separate study, beyond the current paper's scope. In this paper, the author has restrained his speculations to a discussion of potential spillover effects on third-party countries that may arise after the agreement's implementation, assisting in mitigating their losses due to trade diversion. This discussion is pertinent, as it aligns with existing literature on the overall impact of free trade agreements, and I recommend that future research consider incorporating these aspects into their analyses.

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Appendices

Table 3: GE effect of a hypothetical trade integration between US and EU: all countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Endowment GE Indexes					Conditional GE Indexes			
Country	IMR	OMR	Welfare	Exports	Price	IMR	OMR	Welfare	Exports
AGO	−0.193	0.441	−0.183	0.114	−0.376	−0.297	0.368	0.298	−0.195
ARE	−0.193	0.377	−0.129	−0.097	−0.322	−0.286	0.314	0.287	−0.391
ARG	−0.235	0.449	−0.149	0.055	−0.384	−0.348	0.376	0.350	−0.290
AUS	−0.254	0.468	−0.145	−0.033	−0.399	−0.374	0.391	0.375	−0.396
AUT	−0.186	−0.499	0.618	2.763	0.430	−0.072	−0.438	0.072	2.658
BDI	−0.153	0.449	−0.231	0.224	−0.384	−0.255	0.376	0.256	−0.078
BEL	−0.149	−0.463	0.548	1.866	0.398	−0.046	−0.406	0.046	1.807
BEN	−0.171	0.431	−0.197	0.147	−0.368	−0.272	0.360	0.273	−0.159
BFA	−0.164	0.437	−0.210	0.145	−0.373	−0.265	0.365	0.265	−0.155
BGD	−0.213	0.402	−0.130	−0.021	−0.343	−0.313	0.335	0.314	−0.334
BGR	−0.583	−0.812	1.292	2.909	0.702	−0.435	−0.706	0.437	2.723
BOL	−0.214	0.484	−0.199	0.188	−0.413	−0.333	0.406	0.334	−0.167
BRA	−0.240	0.443	−0.138	−0.037	−0.378	−0.353	0.370	0.354	−0.379
BWA	−0.190	0.484	−0.224	0.192	−0.413	−0.306	0.406	0.307	−0.153
CAF	−0.143	0.455	−0.246	0.260	−0.388	−0.244	0.381	0.245	−0.039
CAN	−0.470	0.936	−0.327	−0.044	−0.795	−0.719	0.792	0.724	−0.749
CHE	−0.079	0.190	−0.084	−0.357	−0.163	−0.116	0.154	0.116	−0.467
CHL	−0.238	0.458	−0.154	0.044	−0.391	−0.353	0.383	0.354	−0.306
CHN	−0.240	0.423	−0.121	0.076	−0.361	−0.347	0.353	0.348	−0.240
CIV	−0.188	0.423	−0.173	0.034	−0.361	−0.290	0.353	0.291	−0.273
CMR	−0.189	0.455	−0.199	0.108	−0.388	−0.298	0.380	0.299	−0.220
COG	−0.170	0.445	−0.210	0.230	−0.380	−0.273	0.372	0.274	−0.074
COL	−0.241	0.475	−0.165	−0.022	−0.405	−0.361	0.397	0.362	−0.392
COM	−0.154	0.454	−0.235	0.238	−0.388	−0.256	0.380	0.257	−0.067
CPV	−0.146	0.485	−0.268	0.207	−0.414	−0.256	0.406	0.257	−0.114
CRI	−0.236	0.500	−0.191	−0.010	−0.427	−0.361	0.419	0.363	−0.390
CYP	−0.782	−0.887	1.561	4.094	0.767	−0.627	−0.770	0.631	3.841
CZE	−0.252	−0.675	0.837	2.689	0.583	−0.114	−0.589	0.114	2.556
DJI	−0.149	0.424	−0.214	0.135	−0.362	−0.247	0.354	0.248	−0.160
DNK	−0.226	−0.585	0.731	4.507	0.504	−0.096	−0.511	0.096	4.318
DZA	−0.149	0.360	−0.160	−0.100	−0.308	−0.232	0.300	0.233	−0.355
ECU	−0.235	0.486	−0.180	0.056	−0.415	−0.357	0.407	0.358	−0.313
EGY	−0.177	0.360	−0.130	−0.167	−0.307	−0.265	0.299	0.266	−0.444
ERI	−0.149	0.493	−0.273	0.318	−0.421	−0.259	0.413	0.260	−0.007
ESP	−0.139	−0.404	0.487	5.912	0.348	−0.034	−0.356	0.034	5.722
EST	−0.766	−1.051	1.689	2.707	0.910	−0.591	−0.911	0.594	2.488
ETH	−0.201	0.439	−0.174	0.019	−0.374	−0.308	0.366	0.309	−0.308

Table 3: Continued from the previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Endowment GE Indexes					Conditional GE Indexes			
Country	IMR	OMR	Welfare	Exports	Price	IMR	OMR	Welfare	Exports
FIN	−0.342	−0.649	0.905	4.292	0.559	−0.205	−0.566	0.206	4.095
FRA	−0.086	−0.288	0.334	4.032	0.248	−0.005	−0.256	0.005	3.915
GAB	−0.168	0.442	−0.210	0.159	−0.377	−0.270	0.369	0.271	−0.145
GBR	−0.136	0.268	−0.093	−0.708	−0.229	−0.199	0.220	0.200	−0.956
GHA	−0.206	0.460	−0.188	0.044	−0.393	−0.318	0.385	0.319	−0.295
GIN	−0.165	0.461	−0.229	0.184	−0.393	−0.271	0.385	0.271	−0.129
GMB	−0.158	0.519	−0.285	0.245	−0.442	−0.278	0.435	0.279	−0.104
GNB	−0.141	0.484	−0.272	0.266	−0.413	−0.249	0.405	0.249	−0.048
GNQ	−0.166	0.441	−0.211	0.176	−0.376	−0.267	0.369	0.268	−0.124
GRC	−0.436	−0.538	0.903	5.449	0.464	−0.321	−0.471	0.322	5.211
HKG	−0.244	0.443	−0.135	0.084	−0.378	−0.356	0.370	0.357	−0.260
HRV	−0.609	−0.851	1.352	3.285	0.735	−0.450	−0.739	0.452	3.103
HUN	−0.356	−0.708	0.971	3.143	0.611	−0.211	−0.617	0.211	2.990
IDN	−0.225	0.413	−0.127	−0.023	−0.353	−0.329	0.344	0.330	−0.340
IND	−0.232	0.424	−0.130	−0.015	−0.362	−0.339	0.354	0.340	−0.347
IRL	−0.194	−1.056	1.111	5.458	0.914	0.019	−0.915	−0.019	5.160
IRN	−0.184	0.382	−0.142	−0.067	−0.326	−0.277	0.318	0.278	−0.353
ISL	−0.156	0.445	−0.224	0.032	−0.38	−0.259	0.372	0.260	−0.272
ISR	−0.201	0.390	−0.132	−0.168	−0.333	−0.298	0.325	0.298	−0.473
ITA	−0.047	−0.420	0.408	5.114	0.361	0.065	−0.369	−0.065	4.938
JPN	−0.236	0.419	−0.122	−0.083	−0.358	−0.342	0.349	0.343	−0.408
KAZ	−0.202	0.416	−0.153	0.108	−0.355	−0.303	0.347	0.304	−0.195
KEN	−0.205	0.438	−0.169	0.015	−0.374	−0.314	0.366	0.315	−0.318
KOR	−0.236	0.424	−0.126	0.002	−0.362	−0.343	0.354	0.344	−0.320
LBR	−0.162	0.488	−0.255	0.117	−0.416	−0.279	0.409	0.279	−0.231
LBY	−0.146	0.389	−0.187	0.040	−0.332	−0.234	0.324	0.234	−0.225
LKA	−0.200	0.409	−0.149	−0.019	−0.349	−0.300	0.341	0.301	−0.328
LSO	−0.176	0.504	−0.255	0.284	−0.430	−0.293	0.423	0.294	−0.063
LTU	−0.592	−0.927	1.402	2.570	0.801	−0.430	−0.804	0.432	2.380
LUX	−0.358	−0.571	0.853	1.446	0.492	−0.248	−0.499	0.249	1.375
LVA	−0.741	−1.026	1.641	2.594	0.888	−0.569	−0.889	0.573	2.381
MAR	−0.159	0.377	−0.163	−0.115	−0.322	−0.248	0.313	0.249	−0.387
MDG	−0.170	0.441	−0.207	0.147	−0.377	−0.273	0.369	0.274	−0.161
MEX	−0.379	0.725	−0.239	−0.073	−0.618	−0.570	0.612	0.574	−0.626
MLI	−0.160	0.444	−0.219	0.164	−0.379	−0.262	0.371	0.263	−0.139
MLT	−1.077	−0.931	1.902	6.525	0.805	−0.909	−0.808	0.918	6.236
MOZ	−0.175	0.437	−0.199	0.116	−0.373	−0.279	0.365	0.280	−0.199
MRT	−0.149	0.466	−0.249	0.208	−0.398	−0.254	0.390	0.255	−0.102
MUS	−0.192	0.455	−0.197	0.076	−0.388	−0.302	0.380	0.303	−0.257
MWI	−0.186	0.479	−0.223	0.179	−0.409	−0.300	0.401	0.301	−0.160
MYS	−0.225	0.424	−0.137	0.106	−0.362	−0.330	0.354	0.332	−0.212
NAM	-0.184	0.499	-0.241	0.252	-0.425	-0.302	0.418	0.303	-0.095
NER	−0.155	0.436	−0.217	0.187	−0.372	−0.255	0.364	0.256	−0.110

Table 3: Continued from the previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Endowment GE Indexes					Conditional GE Indexes			
Country	IMR	OMR	Welfare	Exports	Price	IMR	OMR	Welfare	Exports
NGA	−0.222	0.435	−0.150	−0.084	−0.372	−0.331	0.364	0.332	−0.419
NLD	−0.065	−0.517	0.511	3.508	0.445	0.058	−0.453	−0.058	3.365
NOR	−0.142	0.321	−0.133	−0.282	−0.274	−0.215	0.266	0.215	−0.504
NZL	−0.250	0.481	−0.161	−0.009	−0.411	−0.372	0.403	0.374	−0.384
PAK	−0.219	0.432	−0.151	0.094	−0.369	−0.327	0.361	0.328	−0.238
PER	−0.237	0.470	−0.164	0.064	−0.401	−0.356	0.393	0.357	−0.296
PHL	−0.225	0.429	−0.141	−0.087	−0.366	−0.333	0.358	0.334	−0.431
POL	−0.210	−0.494	0.636	4.264	0.426	−0.096	−0.433	0.096	4.080
PRT	−0.402	−0.638	0.956	5.953	0.550	−0.262	−0.557	0.263	5.743
PRY	−0.213	0.473	−0.191	0.162	−0.403	−0.328	0.396	0.329	−0.186
ROM	−0.371	−0.561	0.857	5.166	0.483	−0.248	−0.490	0.248	4.947
RUS	−0.179	0.356	−0.125	−0.150	−0.304	−0.262	0.295	0.263	−0.397
RWA	−0.179	0.467	−0.220	0.183	−0.398	−0.289	0.391	0.290	−0.145
SAU	−0.204	0.389	−0.129	−0.040	−0.333	−0.299	0.324	0.300	−0.329
SDN	−0.161	0.413	−0.192	0.112	−0.353	−0.258	0.345	0.258	−0.180
SEN	−0.169	0.433	−0.201	0.018	−0.370	−0.273	0.362	0.274	−0.294
SGP	−0.239	0.438	−0.135	0.011	−0.374	−0.350	0.366	0.351	−0.332
SLE	−0.164	0.515	−0.275	0.238	−0.439	−0.284	0.432	0.284	−0.111
SOM	−0.171	0.478	−0.237	0.238	−0.408	−0.283	0.400	0.283	−0.094
STP	−0.141	0.472	−0.262	0.270	−0.403	−0.246	0.395	0.246	−0.037
SVK	−0.373	−0.755	1.029	2.322	0.651	−0.223	−0.656	0.224	2.202
SVN	−0.494	−0.869	1.252	1.935	0.751	−0.334	−0.755	0.335	1.818
SWE	−0.224	−0.584	0.729	5.381	0.504	−0.089	−0.510	0.089	5.164
SWZ	−0.182	0.496	−0.242	0.261	−0.423	−0.298	0.416	0.299	−0.084
SYC	−0.162	0.487	−0.254	0.257	−0.415	−0.274	0.408	0.275	−0.073
TCD	−0.151	0.438	−0.223	0.207	−0.374	−0.250	0.366	0.251	−0.088
TGO	−0.157	0.424	−0.205	0.074	−0.362	−0.258	0.354	0.258	−0.230
THA	−0.224	0.418	−0.134	0.026	−0.357	−0.328	0.349	0.329	−0.288
TTO	−0.234	0.553	−0.239	0.068	−0.472	−0.372	0.465	0.374	−0.341
TUN	−0.134	0.370	−0.183	−0.026	−0.316	−0.217	0.308	0.217	−0.277
TUR	−0.160	0.327	−0.120	−0.352	−0.280	−0.238	0.271	0.238	−0.596
TZA	−0.202	0.451	−0.184	0.074	−0.385	−0.312	0.377	0.313	−0.261
UGA	−0.195	0.456	−0.194	0.109	−0.389	−0.306	0.381	0.306	−0.223
UKR	−0.127	0.334	−0.159	−0.198	−0.286	−0.200	0.277	0.201	−0.418
URY	−0.219	0.458	−0.173	0.125	−0.391	−0.332	0.383	0.333	−0.220
USA	−0.927	1.247	−0.131	24.169	−1.057	−1.256	1.059	1.272	23.832
VNM	−0.224	0.422	−0.137	0.083	−0.360	−0.329	0.352	0.330	−0.237

Table 3: Continued from the previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Endowment GE Indexes					Conditional GE Indexes			
Country	IMR	OMR	Welfare	Exports	Price	IMR	OMR	Welfare	Exports
ZAF	−0.232	0.452	−0.154	−0.038	−0.385	−0.346	0.377	0.347	−0.387
ZAR	−0.184	0.430	−0.183	0.121	−0.367	−0.285	0.359	0.286	−0.183
ZMB	−0.190	0.484	−0.223	0.215	−0.413	−0.305	0.405	0.306	−0.126
ZWE	−0.191	0.479	−0.219	0.185	−0.409	−0.305	0.401	0.306	−0.157
DEU	0.000	0.074	−0.064	−0.811	−0.064	0.000	0.054	0.000	−0.816

Notes: This table reports the general equilibrium effect of a hypothetical trade integration between the US and the EU for all countries in the sample. Column (1) to column (5) report the Full Endowment general equilibrium indexes and column (6) to column (9) report the Conditional general equilibrium indexes. Columns (1) and (6) report the percentage changes of the IMR index, columns (2) and (7) report the percentage changes in the OMR index, columns (3) and (8) report the percentage changes in the real GDP index, i.e., the welfare index, columns (4) and (9) report the percentage changes in the exports index, and column (5) reports the percentage change in the factory-gate prices, producer price.

Table 4: Full endowment effect of liberalizing trade based on 'estibrated' trade costs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Effect of US liberalizing trade				Effect of EU liberalizing trade			
Country	IMR	OMR	Welfare	Price	IMR	OMR	Welfare	Price
AGO	−0.395	0.767	−0.259	−0.653	0.230	−0.439	0.147	0.377
ARE	−0.443	0.774	−0.216	−0.659	0.272	−0.458	0.122	0.394
ARG	−0.522	0.892	−0.237	−0.758	0.312	−0.525	0.140	0.453
AUS	−0.545	0.963	−0.275	−0.818	0.337	−0.586	0.168	0.505
AUT	0.248	−0.741	0.390	0.639	−0.207	0.159	0.072	−0.136
BDI	−0.357	0.619	−0.171	−0.527	0.211	−0.361	0.100	0.311
BEL	0.064	−1.136	0.919	0.984	−1.060	0.319	0.796	−0.272
BEN	−0.384	0.664	−0.182	−0.566	0.232	−0.398	0.110	0.342
BFA	−0.202	0.371	−0.115	−0.317	0.119	−0.223	0.073	0.192
BGD	−0.463	0.768	−0.191	−0.654	0.268	−0.441	0.111	0.379
BGR	0.113	−0.347	0.185	0.299	−0.152	0.189	−0.010	−0.162
BOL	−0.576	0.990	−0.266	−0.841	0.337	−0.570	0.153	0.491
BRA	−0.570	0.982	−0.266	−0.835	0.341	−0.577	0.155	0.497
BWA	−0.354	0.588	−0.148	−0.502	0.165	−0.225	0.029	0.194
CAF	−0.186	0.314	−0.082	−0.268	0.109	−0.184	0.049	0.158
CAN	−1.094	1.983	−0.582	−1.669	0.713	−1.250	0.369	1.084
CHE	−0.176	0.497	−0.249	−0.424	0.116	−0.310	0.150	0.266
CHL	−0.647	1.108	−0.295	−0.940	0.397	−0.667	0.177	0.575
CHN	−0.554	0.982	−0.282	−0.835	0.329	−0.578	0.169	0.498
CIV	−0.254	0.452	−0.132	−0.386	0.102	−0.165	0.040	0.142
CMR	−0.278	0.477	−0.129	−0.407	0.122	−0.191	0.042	0.164
COG	−0.333	0.687	−0.253	−0.585	0.188	−0.382	0.140	0.329
COL	−0.776	1.363	−0.381	−1.154	0.486	−0.839	0.238	0.725
COM	−0.237	0.401	−0.107	−0.343	0.127	−0.213	0.056	0.183
CPV	0.138	−0.253	0.080	0.218	−0.081	0.156	−0.053	−0.134
CRI	−0.946	1.639	−0.442	−1.384	0.579	−0.967	0.256	0.836
CYP	0.083	−0.186	0.077	0.160	−0.126	0.174	−0.022	−0.149
CZE	0.046	−0.457	0.347	0.393	−0.270	0.172	0.123	−0.147
DJI	−0.482	0.845	−0.237	−0.718	0.282	−0.494	0.143	0.426
DNK	0.513	−1.262	0.579	1.095	−0.259	0.220	0.072	−0.188
DZA	−0.086	0.110	−0.009	−0.094	0.026	−0.006	−0.021	0.005
ECU	−0.712	1.205	−0.312	−1.022	0.435	−0.724	0.189	0.625
EGY	−0.300	0.514	−0.139	−0.439	0.182	−0.308	0.083	0.265
ERI	−0.226	0.975	−0.604	−0.828	0.157	−0.579	0.341	0.499
ESP	0.196	−0.521	0.252	0.449	−0.346	0.429	−0.021	−0.366
EST	0.275	−1.193	0.757	1.034	−0.247	0.187	0.087	−0.160
ETH	−0.435	0.758	−0.211	−0.645	0.266	−0.460	0.130	0.396
FIN	0.435	−0.981	0.412	0.848	−0.201	0.208	0.023	−0.178
FRA	0.322	−0.743	0.318	0.641	−0.396	0.496	−0.028	−0.423
GAB	−0.228	0.402	−0.116	−0.343	0.103	−0.189	0.059	0.162
GBR	−0.172	0.297	−0.082	−0.254	0.119	−0.202	0.054	0.174
GHA	−0.400	0.684	−0.183	−0.583	0.216	−0.349	0.084	0.300
GIN	−0.335	0.601	−0.178	−0.512	0.195	−0.336	0.094	0.289
GMB	−0.397	0.682	−0.184	−0.581	0.239	−0.409	0.112	0.352

Table 4: Continued from the previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Effect of US liberalizing trade				Effect of EU liberalizing trade			
Country	IMR	OMR	Welfare	Price	IMR	OMR	Welfare	Price
GNB	−0.211	0.467	−0.187	−0.398	0.122	−0.270	0.110	0.232
GNQ	−0.292	0.523	−0.155	−0.446	0.141	−0.253	0.076	0.218
GRC	0.158	−0.401	0.186	0.345	−0.229	0.312	−0.037	−0.266
HKG	−0.569	0.964	−0.252	−0.819	0.342	−0.561	0.141	0.483
HRV	0.229	−0.558	0.251	0.481	−0.182	0.257	−0.038	−0.220
HUN	0.042	−0.526	0.411	0.453	−0.270	0.182	0.115	−0.155
IDN	−0.580	1.017	−0.285	−0.863	0.344	−0.598	0.171	0.515
IND	−0.531	0.934	−0.264	−0.794	0.315	−0.550	0.158	0.474
IRL	1.429	−3.550	1.694	3.147	−0.642	0.290	0.397	−0.248
IRN	−0.375	0.656	−0.184	−0.559	0.219	−0.380	0.108	0.327
ISL	0.016	−0.002	−0.014	0.002	−0.033	0.108	−0.059	−0.092
ISR	−0.436	0.802	−0.247	−0.682	0.261	−0.473	0.145	0.407
ITA	0.418	−1.032	0.474	0.893	−0.334	0.332	0.050	−0.284
JPN	−0.613	1.088	−0.312	−0.924	0.375	−0.657	0.191	0.566
KAZ	−0.239	0.337	−0.050	−0.288	0.104	−0.124	0.003	0.107
KEN	−0.416	0.715	−0.194	−0.609	0.239	−0.403	0.108	0.347
KOR	−0.595	1.061	−0.307	−0.900	0.362	−0.639	0.189	0.551
LBR	−0.523	0.890	−0.234	−0.756	0.311	−0.511	0.129	0.440
LBY	−0.096	0.078	0.029	−0.067	0.016	0.048	−0.058	−0.041
LKA	−0.521	0.914	−0.258	−0.777	0.306	−0.536	0.155	0.461
LSO	−0.441	0.872	−0.302	−0.742	0.205	−0.378	0.120	0.325
LTU	0.170	−0.700	0.434	0.604	−0.415	0.287	0.170	−0.245
LUX	0.175	−0.373	0.145	0.321	−0.577	0.806	−0.109	−0.685
LVA	0.142	−0.390	0.193	0.335	−0.206	0.234	0.005	−0.200
MAR	−0.048	0.044	0.010	−0.038	−0.005	0.061	−0.047	−0.052
MDG	−0.359	0.641	−0.187	−0.546	0.194	−0.344	0.101	0.296
MEX	−1.119	2.141	−0.689	−1.800	0.723	−1.333	0.431	1.157
MLI	−0.203	0.425	−0.160	−0.363	0.123	−0.251	0.093	0.216
MLT	−0.149	0.007	0.143	−0.006	−0.016	−0.015	0.029	0.013
MOZ	−0.423	0.641	−0.124	−0.546	0.237	−0.328	0.044	0.282
MRT	−0.286	0.561	−0.193	−0.478	0.164	−0.325	0.115	0.279
MUS	−0.290	0.477	−0.117	−0.407	0.157	−0.246	0.054	0.211
MWI	−0.354	0.586	−0.146	−0.499	0.161	−0.247	0.051	0.212
MYS	−0.578	1.039	−0.306	−0.882	0.344	−0.607	0.179	0.523
NAM	−0.375	0.635	−0.166	−0.541	0.194	−0.302	0.066	0.259
NER	−0.270	0.446	−0.111	−0.381	0.153	−0.250	0.061	0.214
NGA	−0.354	0.608	−0.164	−0.518	0.197	−0.331	0.087	0.285
NLD	−0.155	−0.668	0.732	0.576	−0.931	0.385	0.608	−0.329
NOR	0.044	−0.032	−0.017	0.027	−0.015	0.041	−0.021	−0.036
NZL	−0.554	0.991	−0.289	−0.841	0.340	−0.601	0.178	0.518
PAK	−0.491	0.844	−0.228	−0.718	0.286	−0.485	0.131	0.417
PER	−0.690	1.183	−0.315	−1.003	0.419	−0.703	0.187	0.607
PHL	−0.607	1.076	−0.308	−0.913	0.365	−0.640	0.186	0.552
POL	0.104	−0.419	0.256	0.360	−0.198	0.216	0.013	−0.185

Table 4: Continued from the previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Effect of US liberalizing trade				Effect of EU liberalizing trade			
Country	IMR	OMR	Welfare	Price	IMR	OMR	Welfare	Price
PRT	0.252	−0.654	0.311	0.564	−0.271	0.364	−0.040	−0.311
PRY	−0.594	0.987	−0.246	−0.838	0.363	−0.593	0.148	0.511
ROM	0.150	−0.335	0.138	0.288	−0.150	0.225	−0.043	−0.192
RUS	−0.208	0.358	−0.098	−0.306	0.094	−0.147	0.033	0.127
RWA	−0.381	0.674	−0.194	−0.574	0.225	−0.396	0.115	0.341
SAU	−0.442	0.793	−0.234	−0.675	0.255	−0.446	0.128	0.384
SDN	−0.402	0.695	−0.191	−0.592	0.239	−0.412	0.115	0.354
SEN	−0.218	0.410	−0.132	−0.350	0.130	−0.237	0.073	0.204
SGP	−0.551	1.046	−0.339	−0.888	0.334	−0.597	0.180	0.514
SLE	−0.388	0.663	−0.178	−0.565	0.223	−0.368	0.093	0.316
SOM	−0.448	0.771	−0.209	−0.656	0.267	−0.457	0.125	0.393
STP	−0.060	0.088	−0.016	−0.075	0.004	0.027	−0.027	−0.023
SVK	0.134	−0.731	0.497	0.631	−0.109	0.130	−0.003	−0.112
SVN	0.006	−0.393	0.332	0.338	−0.092	0.126	−0.016	−0.108
SWE	0.433	−1.022	0.449	0.885	−0.281	0.278	0.043	−0.238
SWZ	−0.397	0.664	−0.169	−0.565	0.219	−0.364	0.093	0.313
SYC	−0.265	0.203	0.091	−0.174	0.147	−0.070	−0.087	0.060
TCD	−0.252	0.419	−0.106	−0.358	0.132	−0.216	0.053	0.185
TGO	−0.338	0.566	−0.145	−0.483	0.201	−0.329	0.081	0.282
THA	−0.584	1.068	−0.324	−0.906	0.349	−0.634	0.197	0.547
TTO	−0.941	1.657	−0.462	−1.399	0.600	−1.024	0.285	0.886
TUN	0.041	−0.143	0.081	0.123	−0.038	0.143	−0.085	−0.123
TUR	−0.179	0.284	−0.064	−0.243	0.094	−0.135	0.021	0.116
TZA	−0.429	0.724	−0.188	−0.617	0.249	−0.414	0.107	0.356
UGA	−0.365	0.631	−0.173	−0.538	0.208	−0.356	0.098	0.306
UKR	−0.115	0.236	−0.087	−0.202	0.059	−0.100	0.027	0.085
URY	−0.538	0.939	−0.261	−0.798	0.329	−0.565	0.157	0.487
USA	−1.536	2.543	−0.602	−2.129	0.907	−1.717	0.583	1.496
VNM	−0.556	1.233	−0.492	−1.045	0.320	−0.729	0.308	0.629
ZAF	−0.379	0.680	−0.201	−0.579	0.211	−0.365	0.103	0.314
ZAR	−0.418	0.777	−0.244	−0.661	0.250	−0.457	0.143	0.394
ZMB	−0.379	0.640	−0.166	−0.545	0.226	−0.380	0.101	0.327
ZWE	−0.403	0.689	−0.185	−0.587	0.223	−0.378	0.101	0.325
DEU	0.000	0.102	−0.087	−0.087	0.000	−0.010	0.009	0.009

Notes: This table reports the full endowment general equilibrium effect of a hypothetical unilateral trade integration between the US and the EU for all countries in the sample. Column (1) to column (4) report the results when the US unilaterally allows free exports of EU goods to the US while column (5) to column (8) report the results when the EU unilaterally allows free exports of US goods to the EU. Columns (1) and (5) report the percentage changes of the IMR index, columns (2) and (6) report the percentage changes in the OMR index, columns (3) and (7) report the percentage changes in the real GDP index, i.e., the welfare index, columns (4) and (8) report the percentage changes in the factory-gate price index, producer price.

Table 5: Add caption

AGO	Angola	DZA	Algeria	LBR	Liberia	RWA	Rwanda
ARE	United Arab Emirates	ECU	Ecuador	LBY	Libya	SAU	Saudi Arabia
ARG	Argentina	EGY	Egypt	LKA	Sri Lanka	SDN	Sudan
AUS	Australia	ERI	Eritrea	LSO	Lesotho	SEN	Senegal
AUT	Austria	ESP	Spain	LTU	Lithuania	SGP	Singapore
BDI	Burundi	EST	Estonia	LUX	Luxembourg	SLE	Sierra Leone
BEL	Belgium	ETH	Ethiopia	LVA	Latvia	SOM	Somalia
BEN	Benin	FIN	Finland	MAR	Morocco	STP	Sao Tome and Principe
BFA	Burkina Faso	FRA	France	MDG	Madagascar	SVK	Slovakia
BGD	Bangladesh	GAB	Gabon	MEX	Mexico	SVN	Slovenia
BGR	Bulgaria	GBR	Great Britain	MLI	Mali	SWE	Sweden
BOL	Bolivia	GHA	Ghana	MLT	Malta	SWZ	Swaziland
BRA	Brazil	GIN	Guinea	MOZ	Mozambique	SYC	Seychelles
BWA	Botswana	GMB	Gambia	MRT	Mauritania	TCD	Chad
CAF	Central African Republic	GNB	Guinea-Bissau	MUS	Mauritius	TGO	Togo
CAN	Canada	GNQ	Equatorial Guinea	MWI	Malawi	THA	Thailand
CHE	Switzerland	GRC	Greece	MYS	Malaysia	TTO	Trinidad and Tobago
CHL	Chile	HKG	Hong Kong	NAM	Namibia	TUN	Tunisia
CHN	China	HRV	Croatia	NER	Niger	TUR	Turkey
CIV	Cote d'Ivoire	HUN	Hungary	NGA	Nigeria	TZA	Tanzania
CMR	Cameroon	IDN	Indonesia	NLD	Netherland	UGA	Uganda
COG	Congo Republic	IND	India	NOR	Norway	UKR	Ukraine
COL	Colombia	IRL	Ireland	NZL	New Zealand	URY	Uruguay
COM	Comoros	IRN	Iran	PAK	Pakistan	USA	United States of America
CPV	Cape Verde	ISL	Iceland	PER	Peru	VNM	Vietnam
CRI	Costa Rica	ISR	Israel	PHL	Philippines	ZAF	South Africa
CYP	Cyprus	ITA	Italy	POL	Poland	ZAR	Congo, Democratic Republic
CZE	Czech Republic	JPN	Japan	PRT	Portugal	ZMB	Zambia
DEU	Germany	KAZ	Kazakhstan	PRY	Paraguay	ZWE	Zimbabwe
DJI	Djibouti	KEN	Kenya	ROM	Romania		
DNK	Denmark	KOR	Korea	RUS	Russia		