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ON THE IMPACT OF TTIP IN SOUTHEASTERN AND EASTERN EUROPE: A QUANTITATIVE ANALYSIS[1]

Despite great general interest and significant controversy surrounding the completion and the potential impact of the Transatlantic Trade and Investment Partnership (TTIP), little attention has been devoted to the impact of this trade megadeal on the EU-member and non-member countries in Southeastern and Eastern Europe. To fill this gap, the objective of this paper is threefold. First, we want to describe the standard quantitative methods that are used to analyze the impact of trade liberalization. Second, we offer a detailed discussion of the decomposition of the transmission channels through which an initial trade liberalization shock (e.g. the formation of TTIP) will affect consumers, producers and total welfare in member countries as well as outsiders. Finally, throughout the analysis, our focus will be on the countries in Southeastern and Eastern Europe, including member countries (e.g. Bulgaria) and non-member countries (e.g. Macedonia). Our findings suggest that, while TTIP will lead to gains for all South-eastern and Eastern European TTIP member countries, their trade costs with the US are still high. Further Southeastern and Eastern European TTIP outsiders will lose, but losses can be mitigated by additional trade with Southeastern and Eastern European TTIP member and other closer Southeastern and Eastern European countries.

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1. Introduction: Motivation and Goals

Policy makers and analysts on both sides of the Transatlantic Trade and Investment Partnership (TTIP) expect that this megadeal will not only lead to more trade but also will stimulate investment.[2] At the same time, many people and popular observers are skeptical about the positive impact of TTIP. Furthermore, while there has been a significant public and scholarly debate around TTIP, the quantitative analysis of the effects of the agreement have mainly focused on the impact on USA and on the more developed EU economies. Much less (if any)

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2 The initial TTIP negotiations started in July 2013 and the negotiating parties include the United States and the European Union members, which together account for more than 50% of GDP in the world, more than 30% of goods trade in the world, and more than 40% of services trade in the world. The initial excitement and optimism of policy makers, e.g. the European Union Trade Commissioner Karel De Gucht, hoped to clinch the U.S. trade deal by late 2014 were not met and, more recently (with Brexit and Mr. Trump's anti-trade agenda), the prospects for a successful conclusion of TTIP seem even more gloom.

attention has been devoted to quantifying the economic consequences for the peripheral EU members from Southeastern and Eastern Europe as well as to non-EU members from Southeastern and Eastern Europe.[3] Finally, anecdotal evidence based on opinions toward TTIP in some of the Southeastern and Eastern European economies suggests that the main mechanisms through which the agreement will affect the countries in this region, and which are at the heart of pretty much all formal quantitative studies on the impact of TTIP,[4] are not clear to the public as well as to many Southeastern and Eastern European policy makers.

The objective of this paper is threefold. First, we want to describe the standard quantitative methods that are used to analyze the impact of trade liberalization. Second, we offer a detailed discussion of the decomposition of the transmission channels through which an initial trade liberalization shock (e.g. the formation of TTIP) will affect consumers, producers and total welfare in member countries as well as outsiders. Third, throughout the analysis, our focus will be on the countries in Southeastern and Eastern Europe, including member countries (e.g. Bulgaria) and non-member countries (e.g. Macedonia).

We present the analysis in two stages. We start with a review of the dynamic structural estimation framework of Anderson, Larch and Yotov (2015b), henceforth ALY. The theoretical foundation of our analysis is presented in Section 2. The choice of ALY's model is motivated by the fact that these authors build a tractable dynamic general equilibrium framework, which nests the static gravity model that is the workhorse of partial and general equilib- rium trade policy analysis. This will enable us to clearly trace and decompose the impact of TTIP on member and non-member countries, with emphasis on representative countries from Southeastern and Eastern Europe, from a theoretical perspective. In addition, ALY extend the standard static gravity model with a dynamic channel through which trade liberalization may impact income and welfare via capital accumulation. This will enable us to discuss the dynamic impact of TTIP on the countries in Southeastern and Eastern Europe. Another attractive feature of ALY's theoretical framework is

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[3] We follow for our definition of Southeastern and Eastern European countries the CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook/fields/2144.html). Accordingly, Southeastern European countries are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro, Romania, Serbia, and Turkey. Eastern European countries are Belarus, Estonia, Latvia, Lithuania, Moldova, and Ukraine. From those countries, we cover in our 89 country sample Belarus, Bulgaria, Croatia, Estonia, Latvia, Lithuania, Macedonia, Romania, Serbia, Turkey, and Ukraine.

[4] Few notable studies include Kommerskollegium (2013), which was conducted by the Swedish National Board of Trade on an initiative from the Ministry of Foreign Affairs in Sweden. Francois and Pindyuk (2013) and Felbermayr et al. (2014) investigate the effects of TTIP for Austria, while Felbermayr et al. (2013) and Felbermayr, Heid and Lehwald (2013) analyze the TTIP impact for Germany. There are two main differences between our work and previous studies. First, their analysis is static, while we also analyze dynamic effects. We are aware of only two other papers (Fontagné, Gourdon and Jean, 2013; Francois et al., 2013) that evaluate the dynamic TTIP effects, but neither of those offers a discussion of the transmission channels for the TTIP effects. Second, none of the above-mentioned studies focuses on the impact of TTIP on the economies in Southeastern and Eastern Europe.

that it lends itself to structural estimation that delivers all key parameters needed to simulate the effects of trade liberalization within their dynamic general equilibrium model. Anderson, Larch and Yotov (2015c) capitalize on this feature to quantify the impact of TTIP for a sample of 89 countries, which account for more than 98% of world's GDP.

In Section 3, we present the empirical approach of Anderson, Larch and Yotov (2015c) and we review their empirical results regarding the trade costs faced by the Southeastern and Eastern European TTIP members. In addition, we complement and extend the analysis of Anderson, Larch and Yotov (2015c) by constructing and discussing corresponding welfare indexes that capture the effects of TTIP for member and non-member countries in this region. Three main findings stand out. First, even after controlling for the effects of geography, newer EU members, including Southeastern and Eastern European countries (e.g. Bulgaria and Romania) face significantly higher trade costs as compared to older and more developed EU economies. Second, the Southeastern and Eastern European TTIP members will enjoy welfare gains from the agreement. Finally, the Southeastern and Eastern European countries that are not part of the EU and TTIP will suffer moderate welfare losses. The natural explanation for this result is trade diversion.

Before we proceed with the analysis, we acknowledge several caveats and opportunities for refinement that need to be taken into account when interpreting our results. First, the analysis is based on aggregate data. Thus, we are not able to evaluate heterogeneous impacts across sectors, neither can we draw inference about structural changes.[5] Second, the initial impact of TTIP is assumed to be equal to the average impact of all regional trade agreements that entered into force between 1989 and 2011. Arguably, the initial (partial equilibrium) impact of TTIP could be quite different from the average impact of the RTAs for which we can perform *ex post* estimation analysis. Furthermore, it can probably vary widely across different EU member countries.[6] Third, on a related note, this study focuses exclusively on the impact of TTIP via trade. Thus, we are abstracting from any direct and indirect geopolitical considerations. Finally, our model captures and decomposes the impact of TTIP on the consumers and on the producers in the world and we abstract from analyzing specific labor market outcomes.[7] Subject to these and possibly other limitations, the current analysis should be viewed as a useful benchmark that theoretically decomposes and empirically quantifies the potential TTIP impact on

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[5] A series of studies have extended the standard gravity model to accommodate sectors. For example, we refer the interested reader to Costinot, Donaldson and Komunjer (2012), Larch and Wanner (2014), Caliendo and Parro (2015), Donaldson (2016), and Anderson and Yotov (2016).

[6] We refer the reader to Baier, Yotov and Zylkin (2016*b*) for a related discussion and analysis.

[7] We refer the reader to the following studies that extend the structural gravity model in order to study labor market outcomes. Eaton and Kortum (2002) derive a Ricardian gravity model with labor on the supply side. Heid and Larch (2016) extend the gravity model to allow for unemployment. Caliendo, Dvorkin and Parro (2015) combine gravity with a dynamic labor search model. Finally, Baier, Yotov and Zylkin (2016*a*) further extend the model to accommodate sectors and heterogeneous labor.

aggregate trade and welfare in the Southeastern and Eastern European economies. As noted in the motivation of the paper, the channels that are presented and discussed here are at the heart of any serious quantitative analysis of trade liberalization.

2. Theoretical Foundations

This section reviews the theoretical framework of Anderson, Larch and Yotov (2015b) and offers a discussion and decomposition of the effects of TTIP with a focus on representative countries from Southeastern and Eastern Europe.

2.1. A Tractable Dynamic Gravity Model

Anderson, Larch and Yotov (2015*b*) build a tractable general equilibrium framework that establishes an intuitive, quantifiable relationship between trade liberalization, capital accumulation and welfare. ALY's contribution to the existing structural gravity literature is the addition of the dynamic, capital accumulation channel. However, their framework also nests and clearly decomposes the standard static channels through which trade liberaliza- tion affects consumers, producers and aggregate welfare in liberalizing countries as well as in non-liberalizing countries/ outsiders. Therefore, we rely on ALY's setup to discuss the potential TTIP effects on member and non-member countries in Southeastern and Eastern Europe.

In order to build their dynamic framework of trade liberalization and growth, ALY nest a standard *N*-country Armington model[8] within a dynamic model, where representative households maximize the present discounted value of their lifetime utility.[9] In addition to choosing consumption, consumers now also choose how much to invest in order to solve the following representative consumer's problem:

$$\max_{\{C_j,\Omega_{j,t}\}} \sum_{t=0}^{\infty} \gamma^{t} \ln(C_{j,t}) \tag{1}$$

$$Y_{j,t} = P_{j,t}C_{j,t} + P_{j,t}\Omega_{j,t} \tag{2}$$

$$C_{j,t} = \sum_i \left(\beta_i^{\frac{1-\sigma}{\sigma}} C_{ij,t}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{3}$$

$$\Omega_{j,t} = \sum_i \left(\beta_i^{\frac{1-\sigma}{\sigma}} I_{ij,t}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{4}$$

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[8] Following Armington (1969), it is assumed that each country in this setting produces a differentiated good. Anderson (1979) was the first to use an *N*-country Armington setting in order to offer theoretical foundations for the gravity model of trade. Anderson and van Wincoop (2003) offer the most popular derivation of gravity under the Armington assumption.

[9] The dynamic channel in ALY is introduced in the spirit of Lucas and Prescott (1971), Hercowitz and Sampson (1991) and Eckstein, Foulides and Kollintzas (1996).

$$Y_{j,t} = p_{j,t} A_{j,t} L_{j,t}^{1-\alpha} K_{j,t}^{\alpha} \tag{5}$$

$$E_{j,t} = \varphi_{j,t} Y_{j,t} \tag{6}$$

$$K_{j,t+1} = \Omega_{j,t}^{\delta} K_{j,t}^{1-\delta} \tag{7}$$

$$K_{j,0} \quad \text{given} \tag{8}$$

where:

- Equation (1) is the consumer's lifetime logarithmic utility function, which translates aggregate consumption into utility, where $0 < \gamma < 1$ is the subjective discount factor.
- Equation (2) is the consumer budget constraint, and it reflects the fact that, at each point of time t, consumers split their income between aggregate consumption $C_{j,t}$ and aggregate investment $\Omega_{j,t}$.
- Aggregate consumption in country j is defined by Equation (3) as a CES aggregate of varieties from all possible trade partners i ($c_{ij,t}$), where β_i is the standard CES share parameter.
- Equation (4) is the CES investment aggregator that combines the investment varieties $I_{ij,t}$ into an aggregate investment good $\Omega_{j,t}$.
- Equation (5) defines the value of production in a standard Cobb-Douglas form, where $p_{j,t}$ is the factory-gate price. Production requires and combines technology $A_{j,t}$, labor $L_{j,t}$ and capital $K_{j,t}$, where α is the Cobb-Douglas capital share.
- Equation (6) relates aggregate expenditure $E_{j,t}$ to the value of production via the exogenous trade-imbalance parameter $\varphi_{j,t}$, indicating a trade deficit of country j in t (if $\varphi_{j,t} > 1$) and a trade surplus otherwise.[10]
- The process of capital accumulation is subject to both a law of motion for the capital stock, given by (7), where δ denotes the capital adjustment costs, as well as known initial values, $K_{j,0}$ in (8).[11]

Solving the consumer's optimization problem delivers the following dynamic system of trade and growth, which nests the now-standard static structural gravity

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[10] We refer the reader to Reyes-Heroles (2016), who develops a related framework with endogenous trade imbalances.

[11] As discussed in ALY, specification (7) departs from the standard linear law of motion for capital accumulation. However, this functional form delivers a closed-form solution for the transition path of capital accumulation, which is extremely convenient for analysis and decomposition of the GE effects of trade policy. ALY find small quantitative differences between the two capital accumulation specifications and offer a discussion of the advantages and disadvantages of the Cobb-Douglas approach as compared to its linear counterpart.

model[12] but also introduces a dynamic channel through which trade liberalization may further affect welfare and growth via capital accumulation:

Direct (PE):

$$X_{ij,t} = \frac{Y_{i,t} E_{j,t}}{Y_t} \left(\frac{t_{ij,t}}{\Pi_{i,t} P_{j,t}} \right)^{1-\sigma} \tag{9}$$

Conditional GE:

$$\Pi_{i,t}^{1-\sigma} = \sum_j \left(\frac{t_{ij,t}}{P_{j,t}} \right)^{1-\sigma} \frac{E_{j,t}}{Y_t} \tag{10}$$

$$P_{j,t}^{1-\sigma} = \sum_i \left(\frac{t_{ij,t}}{\Pi_{i,t}} \right)^{1-\sigma} \frac{Y_{i,t}}{Y_t} \tag{11}$$

Full Endowment GE:

$$p_{i,t} = \left(\frac{Y_{i,t}}{Y_t} \right)^{\frac{1}{1-\sigma}} \frac{1}{\beta_i \Pi_{i,t}} \tag{12}$$

$$E_{i,t} = \varphi_{i,t} Y_{i,t} = \varphi_{i,t} p_{i,t} A_{i,t} L_{i,t}^{1-\alpha} K_{i,t}^{\alpha} \tag{13}$$

Dynamic GE:

$$K_{i,t+1} = \left[\delta\gamma\varphi_{i,t} \frac{\alpha p_{i,t} A_{i,t} L_{i,t}^{1-\alpha} K_{i,t}^{\alpha-1}}{(1-\gamma+\delta\gamma) P_{i,t}} \right]^{\delta} K_{i,t} \tag{14}$$

System (9)-(14) looks familiar because the first four equations of it appear standardly in the gravity literature, which we summarized in Footnote 14. The last equation of this system is the structural dynamic capital accumulation equation of ALY, which, as demonstrated below, is also very intuitive. In the next section, we offer a detailed discussion and interpretation of the equations from system (9)-(14), and we use them to describe and decompose the potential channels through which TTIP will affect member and non-member countries in Southeastern and

[12] One of the main reasons for the popularity of the structural gravity model is that it can be obtained from a series of theoretical foundations. Notable developments over the years include Anderson (1979), Krugman (1980), Bergstrand (1985), Deardorff (1998), Eaton and Kortum (2002), Anderson and van Wincoop (2003), Chaney (2008), Helpman, Melitz and Rubinstein (2008), Anderson and Yotov (2010), Arkolakis, Costinot and Rodríguez-Clare (2012), and Allen, Arkolakis and Takahashi (2014). We refer the reader to Anderson (2011), Arkolakis, Costinot and Rodríguez-Clare (2012), Head and Mayer (2014), Costinot and Rodríguez-Clare (2014), and Larch and Yotov (2016) for surveys of the evolution of the theoretical gravity literature.

Eastern Europe. For illustrative purposes, we use Bulgaria as an example of a member country and Macedonia as a representative non-member country.

2.2. On the Impact of TTIP in Southeastern and Eastern Europe: A Discussion

Equation (9) is the structural gravity equation, which intuitively states that, at each point of time *t*, exports from source *i* to destination *j* are proportional to the sizes of the two trading members, measured by the value of output on the exporter side and by the value of expenditure on the importer side, and inversely proportional to the trade frictions between the two countries/regions, as captured by the composite term $(t_{ij,t}/(\Pi_{i,t}P_{j,t}))^{1-\sigma}$.[13] Here, $t_{ij,t}$ denotes the bilateral trade frictions between partners *i* and *j*,[14] and $\Pi_{i,t}$ and $P_{j,t}$ are coined by Anderson and van Wincoop (2003) as the *multilateral resistance terms*, which we discuss below. As noted earlier, equation (9) has been derived from a series of theoretical foundations on the demand side and on the supply side, and it has served as a theoretical foundation for thousands of regressions that study the impact of various determinants on bilateral trade flows.

For the purpose of characterizing and quantifying the effects of TTIP, equation (9) captures the partial equilibrium (or direct) effects of bilateral trade liberalization on trade between the liberalizing countries. Accordingly, this equation and the corresponding effects are labeled *Direct or Partial Equilibrium (PE)*. As such, (9) cannot capture any impact on outside countries, since they will not be impacted by construction. Considering the partial equilibrium impact of TTIP on Bulgaria and Macedonia, equation (9) will capture the direct impact of the fall in bilateral trade costs on Bulgarian exports to and imports from the United States, while Macedonia will not be affected via this channel since Macedonia is an outside country and all Macedonian bilateral trade costs will remain unchanged when TTIP is formed.

In combination, Equations (10) and (11) define the multilateral resistance terms of Anderson and van Wincoop (2003), where $\Pi_{j,t}$ is labeled *the Outward Multilateral Resistance (OMR)*, and $P_{j,t}$ is labeled *the Inward Multilateral Resistance (IMR)*. Larch and Yotov (2016) discuss in detail six appealing properties of these theoretical indexes, which include:

- The multilateral resistances (MRs) are *intuitive structural terms* because they capture the fact that two countries will trade more with each other the more remote they are from the rest of the world;

[13] We refer the reader to Larch and Yotov (2016) for an intuitive derivation and interpretation of the structural terms in equation (9).

[14] The bilateral term $t_{ij,t}$ is standardly proxied by observable variables, including bilateral distance, the presence of contiguous borders, common language, colonial relationships, free trade agreements, etc. Anderson and van Wincoop (2004) offer a detailed discussion of bilateral trade costs.

• As is evident from the definitions of the MR terms from equations (10) and (11), the multilateral resistances are *theory consistent aggregates* of all possible bilateral trade costs to the country level;

• The multilateral resistances are general equilibrium trade cost terms, which capture the fact that a change in bilateral trade costs, e.g. the formation of TTIP, will result in additional effects (in addition to the direct partial effects) for the TTIP members and also will affect all other countries in the world;

• The multilateral resistances decompose the aggregate incidence of trade costs and their changes on consumers and producers in each country as if the buy and ship their product to a single world market, respectively;

• The MRs are straightforward to construct by solving the non-linear MR system of equations (10) and (11) directly for the MRs or for their power transforms, in which case system (10) and (11) becomes a simple quadratic system. As discussed below, the MR terms can also be recovered directly from the fixed effects of a standard structural estimating gravity equation;

• Finally, owing to the above properties, the MR indexes are very appealing for practical purposes both from a policy perspective and from a structural estimation perspective. We refer the reader to Larch and Yotov (2016) for further details and discussion of the MR terms.

Following Larch and Yotov (2016), we label the additional effects of trade policy that are channeled through the MRs *Conditional General Equilibrium (GE)* effects. These are general equilibrium (GE) effects because a change in bilateral trade costs $t_{ij,t}$ between any two partners will have an impact on all other countries in the world, while, at the same time, they are labeled 'conditional' because country sizes remain unchanged in this scenario. Applied to the TTIP implementation, the additional channels that are operational in the *Conditional GE* scenario suggest that consumers and producers in Bulgaria will enjoy lower multilateral resistances, while consumer and producers in Macedonia will suffer higher mul- tilateral resistances. The intuitive interpretation is that due to TTIP, on average, Bulgaria is becoming more integrated in the world trading system, while Macedonia, as well as all other outside countries, will suffer trade diversion effects due to the formation of TTIP. Importantly, these forces will act even when country sizes remain constant.

Adding Equations (12) and (13) to the system defines the *Full Endowment GE* scenario, where country sizes also change in response to trade liberalization.[15] Specifically, equation (12) captures the fact that a change in the outward multilateral resistance will cause an inversely propositional change in the corresponding factory gate price. As discussed earlier, the formation of TTIP will result in lower outward

[15] As demonstrated in Anderson and van Wincoop (2003), equation (12) is a restatement of the market clearing condition, which states that, at delivered prices, the value of production in one country should be equal to the total purchases of this country's product from all other economies including the country itself.

multilateral resistances for the Bulgarian producers. According to equation (12), the fall in the OMR will translate into higher factory-gate prices $p_{i,t}$ in Bulgaria, which in turn, via equation (13), will lead to an increase in Bulgaria's values of production and expenditure. Note that, via equation (9), the increased size of the Bulgarian market will lead to more exports and more imports of this country, both from its TTIP partners and also from non-TTIP countries too. Finally, the larger size of the Bulgarian economy will lead to an improved position in the world trading system, which is captured by the multilateral resistance equations (10) and (11).

The general equilibrium impact of TTIP on Macedonia will work in the opposite direction. Due to trade diversion away from non-TTIP members, Macedonian producers will suffer an increase in their outward multilateral resistance. In other words, it will be harder from them to ship to the EU market and to the US market. The intuition for this result is that TTIP will provide preferential access to EU and USA in their respective markets, which will make competition for Macedonian products on these markets tougher. The higher OMR will translate into lower factory-gate prices for the Macedonian producers, via equation (12). In turn, via equations (13), the lower factory-gate prices will translate into lower values for output and expenditure in Macedonia. The smaller Macedonian size will result in less imports and less exports of this country, as captured by equation (9). In addition, the smaller size will lead to a lower weight of Macedonia in the world trading system, as captured by equations (10) and (11).

Finally, equation (14) is the policy function for capital and, as expected, it captures the direct relationship between capital accumulation and the levels of technology, labor endowment, and current capital stock.[16] More important from a trade policy perspective, equation (14) suggests a direct relationship between capital accumulation and the domestic factory-gate prices, $p_{i,t}$, and an inverse relationship between capital accumulation and the inward multilateral resistances, $P_{i,t}$. The intuition for the positive impact of factory-gate prices on capital accumulation is that, all else equal, an increase in $p_{i,t}$ translates into a higher value of the marginal product of capital, which naturally stimulates investment. The intuition for the negative relationship between capital accumulation and the inward multilateral resistance, $P_{i,t}$, is twofold. Recognizing that $P_{i,t}$ is the CES price aggregator for consumption and for investment goods, an increase in $P_{i,t}$ means that consumption and investment goods are both more expensive. Thus, treating $P_{i,t}$ as the price of investment goods, the inverse relationship between capital accumulation and the IMR reflects the law of demand for investment goods. At the same time, if $P_{i,t}$ is thought of as the price of consumption goods, equation (14) also reflects the fact that when consumption

[16] ALY show that if the Cobb-Douglas specification for capital accumulation is replaced with the linear capital accumulation function, Equation (14) will be replaced with a standard Euler consumption equation. The difference between the two specifications in terms of quantitative implications are small, however, a closed-form solution of the dynamic gravity system can no longer be obtained.

becomes more expensive, investment will decrease because a higher share of income will be spent on consumption today and less will be saved and transferred for future consumption via capital accumulation. Importantly, both the factory-gate prices and the inward multilateral resistances are general equilibrium indexes and, as such, changes in these indexes in one country may be triggered by trade policy changes in any other country in the world.

Turning to the specific impact of TTIP on Bulgaria and Macedonia, we note the following. As a member country, Bulgaria will experience an increase in factory gate prices, as captured by equation (12), and a fall in the inward multilateral resistance, as captured by equation (11). Both of these changes will work in the same direction and imply increased capital accumulation. The increase in capital in response to trade policy will translate into increased value of output/income in Bulgaria, via Equation (13). The effects on trade of the changes in income due to higher level of capital will be qualitatively identical to the effects of the changes in income in response to changes in factory-gate prices, which we discussed earlier. Specifically, there will be a direct and an indirect effect on Bulgarian trade. The direct effect is that, due to its larger size, Bulgaria will trade more with all other countries, via (9). The indirect effects are that, due to its larger size, Bulgaria will play a more important role in the world trading system. Recognizing that the impact of TTIP on the factory gate price and the IMR in Macedonia will be a decrease and an increase, respectively, implies that the impact of TTIP on Macedonia through the dynamic capital accumulation channel will be negative.

3. Quantifying the impact of TTIP

In this section we summarize the methods of Anderson, Larch and Yotov (2015c), who translate (9)-(14) into an econometric model that is used to evaluate the effects of TTIP with a sample of 89 countries, which account for more than 98% of world's GDP.[17] In addition, we complement the analysis of Anderson, Larch and Yotov (2015c) by constructing and discussing welfare changes in response to TTIP. Given the objective of this paper, our main focus will be on the TTIP effects on the countries in Southeastern and Eastern Europe.

Anderson, Larch and Yotov (2015c) take the following steps in order to evaluate the general equilibrium effects of TTIP:

1. Translate the trade flows equation (9) into an econometric model to obtain estimates of the bilateral trade costs $t_{ij,t}$, including an estimate of the elasticity of trade with respect to trade flows, which will be used to capture the initial impact of TTIP. Importantly, at this stage, Anderson, Larch and Yotov (2015c) allow for differential trade costs across the EU members.[18]

[17] We refer the reader to Anderson, Larch and Yotov (2015c) for a description of the data and for detailed discussions of the analysis presented in this section.

[18] We refer the reader to Head and Mayer (2014) and Piermartini and Yotov (2016) for detailed discussions of

2. Combine the estimates of the bilateral trade costs from step 1 with data on output and expenditure to construct (the power transforms of) the multilateral resistance terms by solving system (10)-(11).[19]

3. Use equation (12) to substitute for the factory-gate price in the expenditure equation (13), then log-linearize and estimate this equation using data on TFP, capital, labor, and the OMRs as obtained from the previous step. This estimating equation will deliver estimates of the labor and capital shares, 1 − *α* and *α*, respectively, and an estimate of the trade elasticity of substitution *σ*.

4. Use $Y_{i,t} = \varphi_{i,t} p_{i,t} A_{i,t} L_{i,t}^{1-\alpha} K_{i,t}^{\alpha}$ to replace $\varphi_{i,t} p_{i,t} A_{i,t} L_{i,t}^{1-\alpha} K_{i,t}^{\alpha}$ equations (14), then log-linearize and estimate this equation, which will deliver the estimates of the capital adjustment costs.

Anderson, Larch and Yotov (2015c) borrow only the consumer discount factor *γ* from the literature. All parameters needed to solve the model are reported in Table 1, which reproduces the corresponding table from Anderson, Larch and Yotov (2015c). As can be seen from the table, all estimated parameters are within the theoretical bounds and, in addition, they are readily comparable to corresponding values from the existing literature.[20]

5. With all parameters and data at hand, solve the model in the baseline scenario, i.e. describe the world trade system as it is, without TTIP in place. At this stage, one can obtain any key national economic indicators of interest such as exports, $\sum_{j \neq i} X_{ij}$ for each country or real production, Y_i/P_i, as a measure of welfare, where the IMR index P_i again takes the intuitive interpretation of a consumer price index.[21]

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the challenges and corresponding solutions for gravity estimations. Yotov et al. (2016) also offer estimation codes for a series of gravity specifications and applications in Stata.

[19] As emphasized by Anderson and Yotov (2010), system (10)-(11) can solve for the multilateral resistances only up to a scalar. Capitalizing on the property of the PPML estimator described in Arvis and Shepherd (2013) and Fally (2015), Anderson, Larch and Yotov (2015*a*) demonstrate how the multilateral resistances can be recovered directly from the exporter and importer fixed effects that are used to estimate the empirical version of the trade flows equation (9).

[20] We note that, consistent with many current papers, all parameters could have been borrowed from the literature and some of them could have been calibrated with data at hand. We view the facts that the structural model can be translated into econometric equations that, in turn, can be used (i) to estimate all key parameters of the model and (ii) to test and establish causal relationships as important advantages of the analysis from Anderson, Larch and Yotov (2015c).

[21] Arkolakis, Costinot and Rodríguez-Clare (2012) offer a welfare index, $\hat{W}_i = \hat{\lambda}_{ii}^{\frac{1}{1-\alpha}}$, which summarizes the impact of trade liberalization on the change in national wellbeing/real consumption, $\hat{W}_i$, based on two sufficient statistics, including the change in the share of expenditure on home goods, $\hat{\lambda}_{ii}$, where $\lambda_{ii} = X_{ii} / E_i$, and the elasticity of substitution *σ*.

6. Introduce TTIP by changing the vector of bilateral trade costs $t_{ij,t}$ as if TTIP was one of the agreements that were already in place in 2011, which is the last year of the sample used in Anderson, Larch and Yotov (2015c).

7. Solve the model in the counterfactual hypothetical scenario with TTIP in place and calculate the percentage changes in any indexes of interest between the baseline scenario from Step 5 and the counterfactual scenario from this step.[22]

Table 1

Parameters estimates

From	Parameter	Min.	Max.
Trade	RTA estimate	0.827 (0.083)**	
	$\hat{t}_{ij}$	1.743	6.095
Income	$\hat{\alpha}$	0.559 (0.040)**	0.832 (0.019)**
	$\hat{\sigma}$	4.766 (0.577)**	10.805 (0.797)**
Capital	δ	0.005 (0.001)**	0.053 (0.005)**
	$\hat{\delta}_i$	0.036 (0.005)**	0.138 (0.012)**
Cons. Discount	$\hat{\gamma}$	0.98	

Notes: This table replicates the corresponding table with structural parameters from Anderson, Larch and Yotov (2015c). Minimum and maximum values for the key parameters are obtained from alternative specifications. Standard errors are reported in parentheses . + $p < 0.10$, * $p < .05$; ** $p < .01$. See Anderson, Larch and Yotov (2015c) for further details.

The main findings of Anderson, Larch and Yotov (2015c) with respect to the countries in Southeastern and Eastern Europe can be summarized as follows. First, the estimates of the trade flows gravity equation deliver an estimate of the effect of RTAs of 0.827 (std.err. 0.083), which is consistent with findings from the literature.[23] The estimate of 0.827 implies an average increase in bilateral trade between the countries that signed RTAs during the period of investigation (1989-2011) of 128.6%

[22] Larch and Yotov (2016) discuss the additional step of constructing confidence intervals for the general equilibrium indexes of interest and point to directions for future research in this area. We view this as an important step both from a scholarly and from a policy perspective.

[23] Estimating the effects of regional trade agreements has been an important topic in the trade gravity literature since Tinbergen (1962). The profession struggled to address the potential endogeneity issues with the identification of effects of RTAs for years, due to lack of good instruments. See Trefler (1993), Magee (2003) and Baier and Bergstrand (2002, 2004) for evolution of related literature. More recently, Baier and Bergstrand (2007) offer an effective econometric approach that addresses the endogeneity issue with the average treatment effect methods from Wooldridge (2010). Recent related RTA studies include Egger et al. (2011), who employ IV methods in a cross-section setting, and Anderson and Yotov (2016), who apply the methods of Baier and Bergstrand in a panel setting with multiple sectors.

([exp(0.827) − 1] × 100). Assuming that TTIP will have the same average impact on its members implies that TTIP will increase world trade by 20.2%. This is a large but not surprising number, given the size of USA and the EU and their respective importance to the world trading system.

Second, importantly, Anderson, Larch and Yotov (2015c) find that, after controlling for geography and trade policy, the newer members of the European Union, including Bulgaria, face significantly larger trade costs for their trade with USA, the other EU countries, and with countries from the rest of the world. This is a negative result for the smaller and poorer economies in Southeastern and Eastern Europe, because it implies that they face more difficulties in shipments. Importantly, the difference in the importance of the USA as trading partner combined with the heterogeneous trade cost estimates across the EU economies translate into heterogeneous responses of total exports among the TTIP countries. Anderson, Larch and Yotov (2015*c*) find that smaller, new EU members experience the least increase in trade. For the Southeastern and Eastern European TTIP member countries we find effects ranging from 18.2% for Bulgaria to 22.7% for Estonia.[24] Finally, we note that, by construction, trade in non-member countries, e.g. Macedonia, will not be affected by TTIP directly.

The general equilibrium TTIP effects are also quite heterogeneous across the TTIP member economies and non-member countries. We depart from the analysis of Anderson, Larch and Yotov (2015c), who report GE effects on trade and capital accumulation. Instead, here we focus on welfare effects, which are obtained as the percentage changes in real income for member and non-member countries triggered by TTIP. The general equilibrium welfare indexes are reported in Table 2. For expositional purposes, and for consistency with the theoretical development presented in this paper, we report the results of TTIP in four stages including: (i) 'Conditional GE' effects; (ii) Full Static GE effects; and (iii) Dynamic effects. For the latter, we report the effects when comparing the real GDPs of the old and new steady-state, and a situation where we take the transition into account and properly discount the real GDP changes following Lucas (1987).[25] For brevity, we only report esti- mates of the impact of TTIP on real GDP.[26] Panel A of the table reports estimates for the TTIP members from Southeastern and Eastern Europe. Panel B reports estimates for the non-TTIP members in Southeastern and Eastern Europe.

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[24] For Croatia we predict total export changes of 18.8%, for Latvia of 21.5%, for Lithuania of 20.2%, and for Romania of 20.3%. Note that the changes in total exports by country differ from the average change in bilateral trade flows of 128.6% that we reported earlier. If the USA is not a very important trading partner, or trade costs with the USA are large, the total exports of a give country will change by less than 128.6%. Additionally, differences in the level of trade costs will lead to different levels of the IMRs and OMRs, again affecting the importance of the USA as a trading partner. The 128.6% change for bilateral trade between the USA and an European TTIP member are actually an upper bound for total changes in exports, which only applies for the change in total exports if the countries entire exports go to the USA.

[25] Please see Anderson, Larch and Yotov (2015b) for further details on the discount methodology.

[26] Corresponding estimate on trade flows are available by request.

Panel C reports results for other important non-TTIP member trading partners for the Southeastern and Eastern European countries.

Table 2

Welfare effects of TTIP for selected countries

Country	Cond. GE	Full Static GE	Full Dynamic GE, SS	Full Dynamic GE, trans.
1	2	3	4	5
Panel A: Southeastern and Eastern European TTIP member countries				
BGR	1.96	4.04	9.78	6.71
EST	2.52	5.23	12.64	8.69
HRV	1.40	3.19	9.00	5.84
LVA	2.30	4.79	11.74	8.03
LTU	2.08	4.37	10.83	7.37
ROM	2.10	4.38	10.75	7.34
Panel B: Southeastern and Eastern European TTIP non-member countries				
BLR	-0.64	-1.14	-1.68	-1.49
MKD	-1.86	-3.05	-3.87	-3.66
SRB	-1.44	-2.38	-3.10	-2.89
TUR	-1.29	-2.16	-2.84	-2.64
UKR	-0.55	-1.00	-1.52	-1.33
Panel C: Other TTIP non-member countries				
RUS	-0.79	-1.33	-1.81	-1.65
TKM	-0.45	-0.80	-1.18	-1.04

Notes: This table presents welfare results from our TTIP scenario. Column (1) lists the country abbreviations. Columns (2) to (5) report percentage changes in welfare for four different scenarios. The “Cond. GE” scenario takes the direct and indirect trade cost changes into account but holds GDPs constant. The “Full Static GE” scenario additionally takes general equilibrium income effects into account. The “Full Dynamic GE” scenario adds the capital accumulation effects. For the latter, we report results that do not take transition into account (in column (4)) and welfare gains that take transition into account (in column (5)). See text for further details.

First, Panel A shows that all Southeastern and Eastern European countries which are members of TTIP gain in terms of real GDP. The gains in the conditional GE scenario range from 1.40% for Croatia to 2.52% for Estonia. These gains are magnified when taking static changes in prices and income and expenditures into account, as seen in column 2 of Table 2. Taking into account the additional dynamic effects due to capital accumulation further magnifies these gains. When looking at the steady-state, the gains now range from 9% to 12.64% for Croatia and Estonia, respectively. Proper discounting decreases these gains to 5.84 and 8.69%, respectively. These results show the potential welfare gains of TTIP for Southeastern and Eastern European TTIP member countries.

Next, we turn to the TTIP impact on the Southeastern and Eastern European non-TTIP member countries. Our findings are reported in Panel B of Table 2, where we see that all of the countries lose. The losses range from -0.55% for Ukraine to -1.86% for Macedonia in the conditional GE scenario, and increase to -1.33 and -3.66% in the Full Dynamic GE scenario taking into account the transition. Once again, Macedonia is the country that will be affected the most. The natural explanation for this result is trade diversion. While TTIP does not change trade costs for non-member countries directly, it opens new avenues for exports from member countries and it increases competition for Macedonian exports to TTIP members in Europe. Southeastern and Eastern European TTIP member countries are some of the most important destinations for Macedonian trade. Therefore, it is natural that some of the losses to Macedonia are due exactly to trade diversion from their trade partners in Southeastern and Eastern Europe.

Our intuition for the trade diversion effects of TTIP is confirmed by comparing these numbers with the corresponding effects for other non-TTIP member countries, such as Russia and Turkmenistan. The estimates from Panel D in Table 2 reveal that the predicted losses for the Southeastern and Eastern European non-TTIP member countries are substantially larger. The natural explanation is that these countries are much more integrated with the TTIP members from the EU. An important policy implication of our results is that the non-TTIP countries from Southeastern and Eastern Europe me neutralize the negative impact of TTIP by further strengthening their (trade) relationships with the rest of the countries from the region. Some of the economies in the regions have already taken steps for deeper integration, e.g. Bulgaria and Macedonia.

Conclusion

While the effects of the Transatlantic Trade and Investment Partnership (TTIP) have been the focus of much debate and attention, none of the existing studies focused on the impact of TTIP in the countries in Southeastern and Eastern Europe. To fill this gap, we use a sample of 89 countries and the dynamic, structural framework of Anderson, Larch and Yotov (2015b) and Anderson, Larch and Yotov (2015c) to quantify the effects of TTIP with a focus on Southeastern and Eastern European TTIP member and non-member countries. We use the methods of these studies to offer deep intuition for the transmission channels of the effects of TTIP on member and non-member countries and we extend on their analysis by offering welfare estimates of the TTIP effects.

Our main findings for the impact of TTIP in Southeastern and Eastern Europe can be summarized as follows: First, Southeastern and Eastern European countries face larger bilateral trade barriers with the USA, as well as European member countries. Second, TTIP will result in welfare gains for the Southeastern and Eastern European TTIP member countries. Turning to non-member countries, the Southeastern and Eastern European TTIP non-member countries will lose, and the losses are predicted to be substantially larger than for other non-TTIP member countries. An important policy implication of our results is that the non-TTIP countries from Southeastern and Eastern Europe me neutralize the negative impact of TTIP by further strengthening their (trade) relationships with the rest of the countries from the region.

References:

Anderson, J. E. (1979). A Theoretical Foundation for the Gravity Equation. - American Economic Review, 69(1), p. 106-116.

Anderson, J. E. (2011). The Gravity Model. - Annual Review of Economics, 3, p. 133-160.

Anderson, J. E., and E. van Wincoop (2003). Gravity with Gravitas: A Solution to the Border Puzzle. - American Economic Review, 93(1), p. 170-192.

Anderson, J. E., and E. van Wincoop. (2004). Trade Costs. - Journal of Economic Literature, 42(3), p. 691-751.

Anderson, J. E., and Y. V. Yotov (2010). The Changing Incidence of Geography. - American Economic Review, 100(5), p. 2157-2186.

Anderson, J., M. Larch, and Y. V. Yotov (2015a). Estimating General Equilibrium Trade Policy Effects: GE PPML. CESifo Working Paper N 5592.

Anderson, J., M. Larch, and Y. V. Yotov (2015 b). Growth and Trade with Frictions: A Structural Estimation Framework. NBER Working Paper N 21377.

Anderson, J., M. Larch, and Y. V. Yotov (2015 c). On the Growth Effects of the Transatlantic Trade and Investment Partnership (unpublished manuscript).

Anderson, J. E., and Y. V. Yotov (2016). Terms of Trade and Global Efficiency Effects of Free Trade Agreements, 1990-2002. - Journal of International Economics, 99(C), p. 279-298.

Arkolakis, C., A. Costinot, and A. Rodríguez-Clare (2012). New Trade Models, Same Old Gains? - American Economic Review, 102(1), p. 94-130.

Armington, P. S. (1969). A Theory of Demand for Products Distinguished by Place of Production. IMF Staff Papers, 16, p. 159-176.

Arvis, J.-F., and B. Shepherd (2013). The Poisson Quasi-Maximum Likelihood Estimator: A Solution to the “Adding up” Problem in Gravity Models. - Applied Economics Letters, 20(6), p. 515-519.

Baier, S. L., and J. H. Bergstrand (2002). On the Endogeneity of International Trade Flows and Free Trade Agreements (unpublished manuscript), available at http://www3.nd.edu/~jbergstr/working_papers.html.

Baier, S. L., and J. H. Bergstrand (2004). The Economic Determinants of Free Trade Agreements. - Journal of International Economics, 64(1), p. 29-63.

Baier, S. L., and J. H. Bergstrand (2007). Do Free Trade Agreements Actually Increase Members’ International Trade? - Journal of International Economics, 71(1), p. 72-95.

Baier, S. L., Y. V. Yotov, and Th. Zylkin (2016a). A General Equilibrium Multi-Industry Gravity model with Heterogeneous Labor (Manuscript).

Baier, S. L., Y. V. Yotov, and Th. Zylkin (2016b). On the widely differing effects of free trade agreements: Lessons from twenty years of trade integration. School of Economics Working Paper Series, 2016-15.

Bergstrand, J. H. (1985). The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence. - Review of Economics and Statistics, 67(3), p. 474-481.

Caliendo, L., and F. Parro (2015). Estimates of the Trade and Welfare Effects of NAFTA. - Review of Economic Studies, 82(1), p. 1-44.

Caliendo, L., M. Dvorkin, and F. Parro (2015). The Impact of Trade on Labor Market Dynamics. National Bureau of Economic Research, Inc NBER Working Papers 21149.

Chaney, Th. (2008). Distorted Gravity: The Intensive and Extensive Margins of In- ternational Trade. - American Economic Review, 98(4), p. 1707-1721.

Costinot, A., and A. Rodríguez-Clare (2014). Trade Theory with Numbers: Quantifying the Consequences of Globalization. - In: Gopinath, G., E. Helpman, and K. S. Rogoff (eds.). Handbook of International Economics, Vol. 4, Chapter 4. Oxford: Elsevier Ltd.

Costinot, A., D. Donaldson, and I. Komunjer (2012). What Goods Do Countries Trade? A Quantitative Exploration of Ricardo's Ideas. - Review of Economic Studies, 79(2), p. 581-608.

Deardorff, A. (1998). Determinants of Bilateral Trade: Does Gravity Work in a Neo- classical World? – In: The Regionalization of the World Economy. NBER Chapters, 7–32. National Bureau of Economic Research, Inc.

Donaldson, D. (2016). Railroads of the Raj: Estimating the Impact of Transportation Infrastructure. - American Economic Review (forthcoming).

Eaton, J., and S. Kortum (2002). Technology, Geography and Trade. - Econometrica, 70(5), p. 1741-1779.

Eckstein, Zvi, C. Foulides, and Tr. Kollintzas (1996). On the Many Kinds of Growth: A Note. - International Economic Review, 37(2), p. 487-496.

Egger, P., M. Larch, K. E. Staub, and R. Winkelmann (2011). The Trade Effects of Endogenous Preferential Trade Agreements. - American Economic Journal: Economic Policy, 3(3), p. 113-143.

Fally, Th. (2014). Structural Gravity and Fixed Effects (unpublished manuscript), available at http://are.berkeley.edu/~fally/research.html.

Felbermayr, G., B. Heid, M. Larch, and E. Yalcin (2014). The Role of TTIP in the New EU Trade Policy Strategy: A Quantitative Analysis with Special Emphasis on Austria. Report on behalf of the Federal Ministry of Economy, Family and Youth.

Felbermayr, G., B. Heid, and S. Lehwald (2013). Die Transat- lantische Handels und Investitionspartnerschaft (THIP). Report on behalf of the Bertelsmann Stiftung, available at http://www.bertelsmann-stiftung.de/cps/rde/xbcr/SID-35FBDC27-4321F2A2/bst/xcms_bst

Felbermayr, G., M. Larch, L. Flach, E. Yalcin, and S. Benz. (2013). Dimensionen und Auswirkungen eines Freihandelsabkommens zwischen der EU und den USA. Report on behalf of the Federal Ministry of Economics and Technology, available at http://www.bmwi.de/DE/Mediathek/publikationen,did=553962.html.

Fontagné, L., J. Gourdon, and S. Jean (2013). Transatlantic Trade: Whither Partnership, Which Economic Consequences? CEPII Policy Brief N 1, September, available at http://www.cepii.fr/CEPII/fr/publications/pb/abstract.asp?NoDoc=6113.

Francois, J. F., and O. Pindyuk (2013). Modeling the Effects of Free Trade Agreements between the EU and Canada, USA and Moldova/Georgia/Armenia on the Austrian Economy: Model Simulations for Trade Policy Analysis. FIW Research Reports 2012/13, N 03, available at http://www.fiw.ac.at/fileadmin/Documents/Publikationen/Studien_2012_13/03-Research

Francois, J. F., M. Manchin, H. Norberg, O. Pindyuk, and P. Tomberger (2013). Reducing Transatlantic Barriers to Trade and Investment: An Economic Assessment. Report for the European Commission, available at http://trade.ec.europa.eu/doclib/docs/2013/march/tradoc_150737.pdf.

Head, K., and Th. Mayer (2014). Gravity Equations: Workhorse, Toolkit, and Cookbook. – In: Gopinath, G., E. Helpman, and K. S. Rogoff (eds.). Handbook of International Economics, Vol. 4, Chapter 3. Oxford: Elsevier Ltd.

Heid, B., and M. Larch (2016). Gravity with Unemployment. - Journal of International Economics, 101, p. 70-85.

Helpman, E., M. Melitz, and Y. Rubinstein (2008). Trading Partners and Trading Volumes. - Quarterly Journal of Economics, 123(2), p. 441-487.

Hercowitz, Zvi, and M. Sampson (1991). Output Growth, the Real Wage, and Employment Fluctuations. - American Economic Review, 81(5), p. 1215-1237.

Kommerskollegium (2013). Potential Effects from and EU-US Free Trade Agreement - Sweden in Focus. Swedish National Board of Trade, available at http://www.kommers.se/Documents/In%20English/Reports/Potential%20Effects%20from%20an%20EU-US%20Free%20Trade%20Agreement%20-%20Sweden%20i%20Focus.pdf.

Krugman, P. R. (1980). Scale Economies, Product Differentiation, and the Pattern of Trade. - American Economic Review, 70(5), p. 950-959.

Larch, M., and J. Wanner (2014). Carbon Tariffs: An Analysis of the Trade, Welfare and Emission Effects. CESifo Working Paper N 4598.

Larch, M., and Y. Yotov (2016). General Equilibrium Trade Policy Analysis with Structural Gravity. World Trade Organization WTO Working Paper ERSD-2016-08.

Lucas, R. E., and E. C. Prescott (1971). Investment Under Uncertainty. - Econometrica, 39(5), p. 659-681.

Lucas, R. E. Jr. (1987). Models of Business Cycles. New York: Basil Blackwell.

Magee, C. S. (2003). Endogenous Preferential Trade Agreements: An Empirical Analysis. - Contributions to Economic Analysis & Policy, 2, Articel 15.

Piermartini, R., and Y. V. Yotov (2016). Estimating Trade Policy Effects with Structural Gravity. WTO Working Paper ERSD-2016-10.

Reyes-Heroles, R. M. (2016). The Role of Trade Costs in the Surge of Trade Imbalances (Manuscript).

Tinbergen, J. (1962). Shaping the World Economy: Suggestions for an International Economic Policy. New York:The Twentieth Century Fund.

Treb, A., C. Arkolakis, and Y. Takahashi. (2014). Universal Gravity. (unpublished manuscript), available at http://www.econ.yale.edu/~ka265/research. html

Trefler, D. (1993). Trade Liberalization and the Theory of Endogeneous Protection: An Econometric Study of U.S. Import Policy. - Journal of Political Economy, 101(1), p. 138-160.

Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data, 2nd ed. Cambridge, Massachusetts:The MIT Press.

Yotov, Y. V., R. Piermartini, J.-A. Monteiro, and M. Larch (2016). An Advanced Guide to Trade Policy Analysis: The Structural Gravity Model. Geneva: UNCTAD and WTO.

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