



Working Paper Series  
BEROC WP No.48

## Trade War and EACU

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December 2017

### Abstract

This paper looks at the effects of the trade war that followed 2014 events in Ukraine on Eurasian Customs Union (EACU). In addition to this, the adjustment in the tariffs of EACU within sectors not affected by the trade war directly is analyzed. The decrease in tariffs within protected sectors of EACU affects positively EACU countries not involved directly into the trade war after the initiation of it. Thought this decrease would have affected negatively EACU countries before the initiation of the trade war. As result, such decrease in tariffs of EACU should have been implemented to counterbalance the negative effect of the trade war on EACU countries not directly involved into it.

**Keywords:** trade war, CU

**JEL Classification:** F13, F14

# 1 Introduction

The ban on imports by Russian Federation was introduced in Meat Products Sector, Dairy Products Sector, and Vegetables, Fruits, Nuts Products Sector in 2014. It was the response to the sanctions introduced by the western countries. The general opinion in Russian Federation is that this ban should be kept in place till the elimination of the sanctions imposed by western countries. Currently, it is not clear when the sanctions and the following ban on imports by Russian Federation will be removed. Because of the introduced ban on imports by Russian Federation, should the tariffs in the sectors of EACU not affected by the trade war be adjusted? The paper addresses this question. In addition to this question, the paper looks at the effects of the trade war in the presence of the sectors not directly affected by it.

Since the data for year 2004 was used in this study, this data should be modified to correspond to the trade arrangements that existed in year 2014. After the breakup of Soviet Union, Belarus, Russian Federation, Ukraine, Uzbekistan, Moldova, Armenia, Kyrgyzstan, Tajikistan and Kazakhstan had become the members of the Commonwealth of Independent States (CIS). These countries predominantly had a free trade between themselves and were free to choose the size of tariffs in trade with the other countries. It means that CIS countries de facto were the part of FTA. In year 2011, these countries officially established CIS Free Trade Area (CIS FTA). So, we can state that CIS countries were the part of FTA in year 2004, for which the data was used in this study. Additional feature of FTA is that FTA member keeps its tariff revenue to itself and does not share it with the other members of FTA.

Also, in year 2010, Russian Federation, Belarus, and Kazakhstan formed Eurasian Customs Union (EACU). Later Armenia in 2014 and Kyrgyzstan in 2015 joined EACU. Similar to CIS FTA members, EACU members had free trade between themselves. As the members of EACU, they had the obligation to apply the same tariff against outside countries within each sector. The exception was made for CIS FTA members with whom EACU members had free trade. The total tariff revenue of EACU was distributed among its members according to the schedule: Russian Federation: 85.33%, Kazakhstan: 7.11%, Belarus: 4.55%, Kyrgyzstan: 1.9%, and Armenia: 1.11%. Though in 2014, the tariff revenue redistribution mechanism worked only for Russian Federation, Kazakhstan, and Belarus and their shares were equal to 87.97%, 7.33%, and 4.7%.<sup>1</sup> The study uses these shares in analysis.

Given the trade arrangements described above, the political protests in 2014 made Ukraine to terminate its membership in CIS FTA. Ukraine moved toward becoming the part of EU. Further, the political protests grew up into armed conflict and the partial loss of the territory by Ukraine. These events made the western countries to introduce the sanctions against some citizens and enterprises of Russian Federation. As its response to the sanctions, Russian Federation introduced the ban on imports from EU countries, Australia, Norway, and USA. The imports in Meat Products Sector, Dairy Products Sector, and Vegetables, Fruits, Nuts Products Sector from these countries were banned. Because of the tensions between Ukraine and Russian Federation, both countries banned the imports from each other in the mentioned sectors.

Though the ban on imports was introduced only by Russian Federation and Ukraine in the limited number of sectors, it affected whole economies of EACU and EU countries. The other members of EACU were affected by the ban on imports introduced by Russian

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<sup>1</sup>The agreement about the redistribution of the import tariff revenue, May 20, 2010.

Federation through the international trade linkages and participation in EACU tariff revenue redistribution. To have a better idea about the effect of the introduced ban, in addition to the sectors directly affected by the ban, the directly unaffected sector was introduced into consideration. Meat and Dairy Products Sectors were used in the model and were directly affected by the trade war. At the same time, Wearing Apparel Products Sector was also used in the model, but was not directly affected by the ban on imports.

Another reason for the introduction of Wearing Apparel Products Sector is to find how the trade war influenced the responses of EACU economies to the change in this sector import tariff of EACU. This way it can be found if any adjustment in tariffs within the sectors of EACU not directly affected by the trade war should have been implemented after its initiation.

The effect from the change in the tariff within the sector of EACU not directly affected by the trade war is considered. If the initial value of the tariff is close to the optimal one, then the sign of this effect depends on if the change in the tariff occurred before or after the initiation of the trade war. The sector with the close to the optimal tariff will be referred to as protected one. The decrease in the tariffs within protected sectors of EACU affects positively EACU countries not involved directly into the trade war after the initiation of it. Thought this decrease affects negatively these countries before the initiation of trade war. As result, such decrease in tariffs of EACU should have been implemented to counterbalance the negative effect of the trade war on EACU countries not directly involved into it.

The evaluation of the effects of the trade wars is done using the methodology outlined in Ossa (2014). The framework is based on the monopolistic competition market structure, which was introduced into international trade by Krugman (1979) and Krugman (1981). This market structure allows for two-way trade within an industry of a specific country. The framework in Ossa (2014) allows for many countries and sectors. It could predict the effects of tariff changes initiated by one or several countries. Markusen and Wagle (1989), Perroni and Whalley (2000), and Caliendo and Parro (2015) presented different frameworks with many countries for the estimation of the welfare effects of the tariff changes initiated by one or several countries.

The remainder of this paper includes: Section 2, which outlines the model; Section 3, which describes the data; Section 4, which outlines the estimation procedure; Section 5, which provides results and describes the underlying mechanisms behind stated results, and Section 6, which provides conclusions.

## 2 Model

### 2.1 General Model

The model setup is as in Ossa (2014). There are  $N$  countries. These  $N$  countries are indexed by  $i$  or  $j$ . The utility function of a representative consumer in Country  $j$  is specified as:

$$U_j = \prod_s \left( \sum_i \int_0^{M_{is}} x_{ijs} (\nu_{is})^{\frac{\sigma_s-1}{\sigma_s}} d\nu_{is} \right)^{\frac{\sigma_s}{\sigma_s-1} \mu_{js}}$$

where  $x_{ijs}$  is the quantity of variety,  $\nu_{is}$ , from Sector  $s$  of Country  $i$  that was consumed in Country  $j$ .

Each variety is uniquely associated with an individual firm. Within a particular country, the technology is homogeneous across firms and summarized by the following inverse production functions:

$$l_{is} = \sum_j \frac{\theta_{ijs} x_{ijs}}{\varphi_{is}}, \quad (1)$$

where  $\theta_{ijs} \geq 1$  is the iceberg trade barrier. The expression (1) specifies the amount of labor demanded by the company in Sector  $s$  of Country  $i$  provided it sells quantities  $x_{ijs}$ .

Utility maximization implies that firms in Sector  $s$  of Country  $i$  face the demand  $x_{ijs} = \frac{(\theta_{ijs} p_{is} \tau_{ijs})^{-\sigma_s}}{P_{js}^{1-\sigma_s}} \mu_{js} X_j$  from the consumers in Country  $j$ , where  $\tau_{ijs} = 1 + t_{ijs}$ .  $t_{ijs}$  represents advalorem tariff imposed by Country  $j$  on goods coming from Country  $i$  in Sector  $s$ .  $X_j$  and  $P_{js}$  represent Country  $j$ 's income and its Sector  $s$  price index.  $\theta_{ijs} p_{is}$  represents the before tariff price of the variety shipped from Country  $i$  to Country  $j$  within Sector  $s$ . And,  $p_{is}$  is the factory price of this variety.

Given CES preferences, the producers set prices with the constant markup over marginal cost:

$$p_{is} = \frac{\sigma_s}{\sigma_s - 1} \frac{w_i}{\varphi_{is}}. \quad (2)$$

The trade flow from Country  $i$  to Country  $j$  within Sector  $s$  that is evaluated at the world prices is equal to  $T_{ijs} = M_{is} x_{ijs} \theta_{ijs} p_{is}$ . The expressions for  $x_{ijs}$  and  $p_{is}$  give the expression for the trade flow

$$T_{ijs} = M_{is} \left( \frac{\sigma_s}{\sigma_s - 1} \frac{\theta_{ijs} w_i}{\varphi_{is} P_{js}} \right)^{1-\sigma_s} \tau_{ijs}^{-\sigma_s} \mu_{js} X_j. \quad (3)$$

After the substitution of the expressions for  $l_{is}$ ,  $x_{ijs}$ , and  $p_{is}$  into  $\pi_{is} = M_{is} \sum_j p_{is} \theta_{ijs} x_{ijs} - M_{is} w_i l_{is}$ , we receive

$$\pi_{is} = \frac{1}{\sigma_s} \sum_j M_{is} \left( \frac{\sigma_s}{\sigma_s - 1} \frac{\theta_{ijs} w_i}{\varphi_{is} P_{js}} \right)^{1-\sigma_s} \tau_{ijs}^{-\sigma_s} \mu_{js} X_j. \quad (4)$$

Taking into account the expression (3), the industry-level profit can be expressed as  $\pi_{is} = \frac{1}{\sigma_s} \sum_j T_{ijs}$ . So,  $\pi_{is}$  can be computed using the data on trade flows between countries.

After the substitution of the expression (2) for  $p_{is}$  into the expression for the price index  $P_{js} = \left( \sum_i M_{is} (p_{is} \theta_{ijs} \tau_{ijs})^{1-\sigma_s} \right)^{\frac{1}{1-\sigma_s}}$ ,  $P_{js}$  can be expressed through wage rates across countries:

$$P_{js} = \left( \sum_i M_{is} \left( \frac{\sigma_s}{\sigma_s - 1} \frac{w_i \theta_{ijs} \tau_{ijs}}{\varphi_{is}} \right)^{1-\sigma_s} \right)^{\frac{1}{1-\sigma_s}}. \quad (5)$$

Also, after the substitution of the expressions (1) and (2) for  $l_{is}$  and  $p_{is}$  into the expression for the profit collected by the firms  $\pi_{is} = M_{is} \left( \sum_j p_{is} \theta_{ijs} x_{ijs} - w_i l_{is} \right)$ , we receive  $w_i M_{is} l_{is} = \pi_{is} (\sigma_s - 1)$ . Further, the substitution of this expression into the labor market

clearing condition  $L_i = \sum_s M_{is}l_{is}$  gives

$$w_i L_i = \sum_s \pi_{is} (\sigma_s - 1). \quad (6)$$

In case, Country  $j$  is not EACU member ( $j \notin EACU$ ), country's income consists of its labor income, tariff revenue and firms' profits:

$$X_j = w_j L_j + \sum_i \sum_s t_{ijs} T_{ijs} + \sum_s \pi_{js} \quad (7)$$

In case, Country  $j$  belongs to EACU ( $j \in EACU$ ), country's income consists of its labor income, a part of EACU tariff revenue and firms' profits:

$$X_j = w_j L_j + \alpha_j \sum_{k \in EACU} \sum_i \sum_s t_{iks} T_{iks} + \sum_s \pi_{js} \quad (8)$$

where  $\alpha_j$  represents Country  $j$  share of EACU tariff revenue. The expression (8) differs from the expressions in Ossa (2014), since Ossa (2014) did not consider the possibility that trading partners could form CU.

Similar to Ossa (2014), the conditions (4) - (8) can be solved for unknowns  $w_i$ ,  $X_i$ ,  $P_{is}$ , and  $\pi_{is}$  given numeraire and the parameters  $\{M_{is}, \theta_{ijs}, \varphi_{is}\}$ . At the same time, the estimation of these parameters is not easy and precludes the solution of the conditions (4) - (8) for unknown variables.

## 2.2 Model in Changes

To avoid the estimation of the parameters  $\{M_{is}, \theta_{ijs}, \varphi_{is}\}$ , Ossa (2014) suggested to write down the the conditions (4) - (7) in ratios instead of levels. Expressing the model variables in ratios was used before by Dekle, Eaton, Kortum (2007). Let  $\hat{x} = \frac{x'}{x}$ , according to Ossa (2014), the expression (4) becomes

$$\hat{\pi}_{is} = \sum_j \alpha_{ijs} \left[ \frac{\hat{w}_i}{\hat{P}_{js}} \right]^{1-\sigma_s} \hat{\tau}_{ijs}^{-\sigma_s} \hat{X}_j, \quad (9)$$

where  $\alpha_{ijs} = \frac{T_{ijs}}{\sum_n T_{ins}}$ . Further, Ossa (2014) rewrote the expression (5) as

$$\hat{P}_{js} = \left( \sum_i \gamma_{ijs} (\hat{w}_i \hat{\tau}_{ijs})^{1-\sigma_s} \right)^{\frac{1}{1-\sigma_s}}, \quad (10)$$

where  $\gamma_{ijs} = \frac{\tau_{ijs} T_{ijs}}{\sum_m \tau_{mjs} T_{mjs}}$ . The expression (6) can be written in ratios as

$$\hat{w}_i = \sum_s \delta_{is} \hat{\pi}_{is}, \quad (11)$$

where  $\delta_{is} = \frac{\sum_j \frac{\sigma_s - 1}{\sigma_s} T_{ijs}}{\sum_t \sum_n \frac{\sigma_t - 1}{\sigma_t} T_{int}}$ . The expression (7) in ratios can be written as

$$\widehat{X}_j X_j = w_j L_j \widehat{w}_j + \sum_i \sum_s t'_{ijs} T_{ijs} \widehat{\tau}_{ijs}^{-\sigma_s} \left[ \frac{\widehat{w}_i}{\widehat{P}_{js}} \right]^{1-\sigma_s} \widehat{X}_j + \sum_s \pi_{js} \widehat{\pi}_{js} \quad (12)$$

The expression (8) in ratios can be written as

$$\widehat{X}_j X_j = w_j L_j \widehat{w}_j + \alpha_j \sum_{k \in EACU} \sum_i \sum_s t'_{iks} T_{iks} \left[ \frac{\widehat{w}_i}{\widehat{P}_{ks}} \right]^{1-\sigma_s} \widehat{\tau}_{iks}^{-\sigma_s} \widehat{X}_k + \sum_s \pi_{js} \widehat{\pi}_{js} \quad (13)$$

The expression (13) directly takes into account that the change in the income of EACU member depends on the change in EACU income.

If  $j \notin EACU$ , the expressions (4), (6), (7), and the assumption of the balanced trade across countries give  $X_j = \sum_i \sum_s \tau_{ijs} T_{ijs}$ . If  $j \in EACU$ , the expressions (4), (6), (8),

and the assumption of the balanced trade across countries give  $X_j = \sum_i \sum_s \tau_{ijs} T_{ijs} +$

$\alpha_j \sum_{k \in EACU} \sum_i \sum_s t_{iks} T_{iks} - \sum_i \sum_s t_{ijs} T_{ijs}$ . In this case, country's income is adjusted for

the difference between the collected tariff revenue and country's share of EACU total tariff revenue. Also, the expressions (4), (6) lead to  $w_j L_j = \sum_i \sum_s \frac{\sigma_s - 1}{\sigma_s} T_{jis}$  (equivalently,

$w_i L_i = \sum_s \sum_j \frac{\sigma_s - 1}{\sigma_s} T_{ijs}$ ). As result,  $\alpha_{ijs}$ ,  $\delta_{is}$ ,  $\gamma_{ijs}$ ,  $\pi_{js}$ ,  $w_j L_j$ , and  $X_j$  in equations (9) - (13)

can be computed using the data on tariffs,  $t_{ijs}$ , and the values of trade flows,  $T_{ijs}$ , evaluated at the world prices. Given the ratio of the modified to initial tariffs,  $\widehat{\tau}_{ijs} = \frac{1+t'_{ijs}}{1+t_{ijs}}$ , the equations

(9) - (13) can be solved for  $\widehat{w}_i$ ,  $\widehat{X}_i$ ,  $\widehat{\pi}_{is}$ , and  $\widehat{P}_{js}$ . Only the information on the trade flows and tariffs is needed to find the response of variables in the model to the changes in tariffs.

One of the assumptions of the model is that the trade is balanced across countries:  $NX_i = \sum_j \sum_s (T_{ijs} - T_{jis}) = 0$ . At the same time, the trade flows between countries do not satisfy

this condition. To adjust for this fact, Ossa (2014) suggested to balance the trade flows before calculating the response to the tariff changes. Particularly, Ossa (2014) suggested to put  $\widehat{\tau}_{ijs} = 1$  in equations (9), (10), (12). The equation (13) was not mentioned, since no custom unions was assumed in Ossa setup. Further, Ossa augmented the equation (12) with the additional term  $\frac{NX_j}{X_j} \widehat{NX}_j$  where  $NX'_j = 0$ . The resulted system of the equations (9)-(12) then should be solved for  $\widehat{w}_i$ ,  $\widehat{X}_i$ ,  $\widehat{\pi}_{is}$ , and  $\widehat{P}_{js}$ . According to Ossa (2014), the resulted changes in trade flows  $\widehat{T}_{ijs} = \left[ \frac{\widehat{w}_i}{\widehat{P}_{js}} \right]^{1-\sigma_s} \widehat{X}_j$  should bring the balanced trade  $NX'_i = 0$ .

As in Ossa (2014),  $\widehat{\tau}_{ijs} = 1$  is assumed in equations (9) and (10). As in Vashchilko (2017), for the adjustment of trade flows, the equation (12) is replaced by  $NX'_i = \sum_j \sum_s (T'_{ijs} - T'_{jis}) =$

0, where  $T'_{ijs} = \widehat{T}_{ijs} T_{ijs}$  with  $\widehat{T}_{ijs} = \left[ \frac{\widehat{w}_i}{\widehat{P}_{js}} \right]^{1-\sigma_s} \widehat{X}_j$ . In this case,  $T'_{ijs}$  and  $NX'_i$  represent the

adjusted trade flows and net exports. The condition  $NX'_i = 0$  leads to

$$\sum_j \sum_s \left( T_{ijs} \left[ \frac{\widehat{w}_i}{\widehat{P}_{js}} \right]^{1-\sigma_s} \widehat{X}_j - T_{jis} \left[ \frac{\widehat{w}_j}{\widehat{P}_{is}} \right]^{1-\sigma_s} \widehat{X}_i \right) = 0. \quad (14)$$

This way the requirement for the balanced trade is imposed directly. To find the adjusted trade flows that lead to  $NX'_i = 0$ , we solve equations (9) - (11) and (14) for  $\widehat{w}_i$ ,  $\widehat{X}_i$ ,  $\widehat{\pi}_{is}$ , and  $\widehat{P}_{js}$ , assuming  $\widehat{\tau}_{ijs} = 1$  in the equations (9) and (10). The adjusted trade flows are calculated as  $T'_{ijs} = T_{ijs} \left[ \frac{\widehat{w}_i}{\widehat{P}_{js}} \right]^{1-\sigma_s} \widehat{X}_j$ .

### 3 Data

The trade flows between countries,  $T_{ijs}$   $i \neq j$ , were taken directly from the industry-level trade data of the Global Trade Analysis Project database (GTAP 7). This data base contains the industry-level trade and production data for the year 2004.  $T_{iis}$  are computed by subtracting Country  $i$  industry-level export from its industry-level production that comes from this database. The tariffs,  $t_{ijs}$ , were taken from Trade Analysis Information System (TRAINS) database. The estimation was conducted using the data for Meat Products Sector, Dairy Products Sector, and Wearing Apparel Products Sector, because the trade flows only within these sectors were supplemented by the tariffs from TRAINS database. The values of the demand elasticities,  $\sigma_s$ , were taken from Ossa (2014).

### 4 Estimation

The estimation starts with the adjustment procedure to obtain the balanced trade flows across countries. The trade flows between countries,  $T_{ijs}$ , tariffs,  $t_{ijs}$  ( $\tau_{ijs}$ ), and the elasticities,  $\sigma_s$ , are used in the adjustment procedure. Initially,  $\alpha_{ijs}$ ,  $\gamma_{ijs}$ , and  $\delta_{is}$  are computed according to the expressions located below the equations (9), (10) and (11). Further assuming  $\widehat{\tau}_{ijs} = 1$  in the equations (9) and (10), the equations (9), (10), (11), and (14) are solved numerically for  $\widehat{w}_i$ ,  $\widehat{P}_{is}$ ,  $\widehat{\pi}_{is}$ , and  $\widehat{X}_i$ . Given the solution, the adjusted trade flows are computed as  $T'_{ijs} = T_{ijs} \left[ \frac{\widehat{w}_i}{\widehat{P}_{js}} \right]^{1-\sigma_s} \widehat{X}_j$ . For the adjusted trade flows,  $NX'_i = \sum_j \sum_s \left( T'_{ijs} - T'_{jis} \right) = 0$ .

After the adjustment procedure, the effects of tariff changes can be evaluated. The first tariff changes that will be analyzed correspond to the formation of EACU. The transition toward EACU can be broken down into two steps. The first step implements the redistribution of EACU tariff revenue according to the agreed shares. The second step corresponds to the adjustment of the tariff rates of EACU members to EACU levels. The adjusted trade flows,  $T'_{ijs}$ , the initial tariffs,  $t_{ijs}$  ( $\tau_{ijs}$ ), the modified tariffs,  $t'_{ijs}$  ( $\tau'_{ijs}$ ), and the elasticities,  $\sigma_s$ , are used in the evaluation of EACU formation.

As for the first step, the calculation of EACU members' incomes should be done according to  $X_j = \sum_i \sum_s \tau_{ijs} T'_{ijs} + \alpha_j \sum_{k \in EACU} \sum_i \sum_s t_{iks} T'_{iks} - \sum_i \sum_s t_{ijs} T'_{ijs}$ . For none EACU countries, incomes are computed as  $X_j = \sum_i \sum_s \tau_{ijs} T'_{ijs}$ . In addition to  $X_j$ ,  $\pi_{is}$ ,  $w_j L_j$  should be

computed as  $\pi_{is} = \frac{1}{\sigma_s} \sum_j T_{ijs}^a$  and  $w_j L_j = \sum_i \sum_s \frac{\sigma_s - 1}{\sigma_s} T_{jis}^a$ .

As for the second step, given the calculated  $\pi_{is}$ ,  $w_j L_j$ , and  $X_j$  during the first step,  $\hat{w}_i$ ,  $\hat{X}_i$ ,  $\hat{\pi}_{is}$ , and  $\hat{P}_{js}$  are computed in response to the change in tariffs  $\hat{\tau}_{ijs} = \frac{\tau'_{ijs}}{\tau_{ijs}}$ . Initially,  $\alpha_{ijs}$ ,  $\gamma_{ijs}$ , and  $\delta_{is}$  are computed according to the expressions located below the equations (9), (10) and (11), using the adjusted trade flows,  $T_{ijs}^a$ , the initial tariffs,  $t_{ijs}$  ( $\tau_{ijs}$ ), and the elasticities,  $\sigma_s$ . Given computed  $\alpha_{ijs}$ ,  $\gamma_{ijs}$ ,  $\delta_{is}$ ,  $\pi_{is}$ ,  $w_j L_j$ ,  $X_j$ , and  $\hat{\tau}_{ijs}$ , the equations (9), (10), (11), (12), and (13) can be set up. Finally, these equations should be solved for  $\hat{w}_i$ ,  $\hat{X}_i$ ,  $\hat{\pi}_{is}$ , and  $\hat{P}_{js}$ . The responses of  $w_i$ ,  $X_i$ ,  $\pi_{is}$ , and  $P_{js}$  to any other change in tariffs are computed similarly.

Given  $\hat{w}_i$ ,  $\hat{X}_i$ ,  $\hat{\pi}_{is}$ , and  $\hat{P}_{js}$  resulted from any particular change in the tariffs, the other variables of interest can be computed. The trade flows after the modification of tariffs are equal to  $T'_{ijs} = T_{ijs} \left[ \frac{\hat{w}_i}{\hat{P}_{js}} \right]^{1-\sigma_s} (\hat{\tau}_{ijs})^{-\sigma_s} \hat{X}_j$ .

The change in the real wage,  $\tilde{w}_i$ , the real tariff revenue,  $\tilde{R}_i$ , the real profit,  $\tilde{\pi}_i$ , and welfare,  $W_i$ , are computed as in Vashchilko (2017). Further, let's denote  $LS_{is} = \frac{L_{is}}{L_i}$  as Sector  $s$  labor share of Country  $i$ . For the change in labor employed in Sector  $s$  of Country  $i$ , we have  $\hat{L}_{is} = \frac{L'_{is}}{L_{is}} = \frac{w'_i L'_{is}}{w_i L_{is}} \frac{w_i L_i}{w'_i L_i}$ . Then  $\hat{L}_{is} = \frac{LS'_{is}}{LS_{is}} = \widehat{LS}_{is}$ .

## 5 Results

The paper looks at the effects of the trade war that followed 2014 events in Ukraine. Belarus, Russian Federation, and Kazakhstan were part of EACU in year 2014. At the same time, in year 2004 for which the data are available, Belarus, Russian Federation, and Kazakhstan were not the part of EACU. These countries were de facto a part of FTA with the other CIS countries. To adjust for this fact, the tariff levels for Belarus, Russian Federation, and Kazakhstan were modified to the levels corresponding to the year 2010, when EACU was established. Because of Ukraine's accession to WTO in 2008, its tariffs were modified from year 2004 levels to year 2008 levels. The changes in the trade flows in the response to the changes in tariffs from 2004 levels to 2010 levels were evaluated using the framework by Ossa (2014). The resulted tariffs and trade flows is the initial point for the estimation of trade war effects.

Though the trade war affected Meat Products Sector, Dairy Products Sector, and Vegetables, Fruits, Nuts Products Sector, only Meat and Dairy Products Sectors among directly affected ones were included into analysis. In addition to these sectors, Wearing Apparel Products Sector was included into analysis and represents the sector not directly affected by the trade war. The choice of these sectors is based on the processed data.

In the first subsection of this section, the outcomes of EACU formation are discussed. In the second subsection, the analysis of trade war is conducted assuming that EACU members continue to apply the common tariffs in spite of the deviation by Russian Federation from the common tariffs. In the third subsection, the analysis of the tariff adjustment in Wearing Apparel Sector of EACU in the response to the introduction of the ban on imports by Russian Federation in Meat and Dairy Products Sectors is analyzed.



## 5.1 Transition toward EACU

When EACU was formed in 2010, Belarus, along with Russian Federation and Kazakhstan set up a common external tariff in each sector. Specifically, the common external tariff was equal to 30% in Meat Products Sector, 16,7% in Dairy Products Sector, and 10% in Wearing Apparel Products Sector. The pre-EACU tariffs for EACU members in Meat and Dairy Products Sectors were lower than the corresponding common external tariffs. This fact is in agreement with trade theory. At the same time the pre-EACU tariffs for Russia and Belarus in Wearing Apparel Products Sector were equal to 20%. While the pre-EACU tariff for Kazakhstan was equal to 5%. EACU tariff in this sector (10%) probably represents the negotiation outcome. In this case, Russia and Belarus did not push Kazakhstan to increase its tariff above 20%, which would have resulted in substantial increase in prices within this sector of Kazakhstan. In response to relatively small increase in the tariff within Wearing Apparel Products Sector, Kazakhstan could have lowered the tariff in its highly protected sectors in transition toward EACU. The process of tariff negotiation in transition toward customs union could be far from trivial.

	$\Delta W$	$\Delta \tilde{w}$	$\Delta \tilde{\pi}$	$\Delta \tilde{R}$
Belarus	-0.005%	0.02%	0.09%	-18.3%
Russian Federation	-0.005%	0.19%	0.33%	-24.9%
Kazakhstan	-0.29%	-0.14%	-0.12%	62.5%
Ukraine	0.01%	0.03%	0.07%	-2.6%
EU countries	-0.02 ÷ 0.08%	-0.01 ÷ 0.04%	-0.05 ÷ 0.04%	-0.01 ÷ 4%

$W$  - welfare,  $\tilde{w}$  - real wage,  $\tilde{\pi}$  - real profit,  $\tilde{R}$  - real tariff revenue

Table 1: The effect of the transition from FTA to EACU

According to the estimation, the results of which are in Table (1), all the members of newly formed EACU experienced the decrease in their welfare. The reason why Russian Federation and Belarus did not benefit from EACU formation is the decrease in their tariff within Wearing Apparel Products Sector from 20% to 10% during the transition from CIS FTA to EACU. The decrease in the welfare of Kazakhstan is associated with the decline in its real wage and profit. This decline is explained in part by the increase in the price within Wearing Apparel Products Sector of Kazakhstan resulted from the increase in its tariff in this sector from 5% to 10%. To evaluate the full effect from EACU formation, more sectors should be added into analysis.

## 5.2 Trade War

The starting point for this subsection is the tariffs and trade flows resulted from the formation of EACU, the accession of Ukraine to WTO, and establishing the EU-Ukraine Deep and Comprehensive Free Trade Area.

Establishing the EU-Ukraine Deep and Comprehensive Free Trade Area sparked the trade war. Russian Federation introduced counter-sanctions in response to the sanctions imposed by western countries. The counter-sanctions resulted in the ban by Russian Federation of the imports in Meat and Dairy Products Sectors from EU countries, USA, Australia, and

Norway. Also, Russian Federation and Ukraine banned the imports from each other within these sectors.

In this subsection, we analyze the outcome of the introduced restrictions on import. Within Ossa (2014) framework, the ban on imports is modelled as 800% tariff on imports. In spite of deviation by Russian Federation from the common tariffs, the other EACU members continued to follow the common tariff policy. Moreover, EACU members continued to participate in the redistribution of EACU tariff revenue.

	$\Delta W$	$\Delta \tilde{w}$	$\Delta \tilde{\pi}$	$\Delta \tilde{R}$
Belarus	-0.032%	-0.003%	0%	-18.7%
Russian Federation	-0.37%	-0.26%	-0.01%	-19.1%
Kazakhstan	-0.11%	-0.01%	-0.02%	-18.5%
Ukraine	-0.59%	-0.28%	-0.52%	-31.4%
EU countries	-0.04 ÷ 0%	-0.04 ÷ 0%	-0.07 ÷ 0%	-1.03 ÷ 0.5%

$W$  - welfare,  $\tilde{w}$  - real wage,  $\tilde{\pi}$  - real profit,  $\tilde{R}$  - real tariff revenue

Table 2: The effect of the trade war with EACU in place

According to the estimation, the trade war led to the outcomes outlined in Table (2). Right away, we can notice substantial decreases in the welfare of Russian Federation and Ukraine that resulted from the introduced bans on imports. In addition to the substantial decrease in the tariff revenue because of banned imports, the model predicts the decrease in the real wages in these countries as well. The decrease in the welfare of Ukraine is not in contradiction with the increase in its welfare described in Vashchilko (2017). The described there increase was the result of both trade war and the establishment of the EU-Ukraine Deep and Comprehensive Free Trade Area. Though the results described in Table (2) correspond to the trade war only.

The decrease in the tariff revenue of Belarus is mainly associated with the tariff revenue redistribution among EACU members. Without the tariff revenue redistribution, the tariff revenue of Belarus would have increased by 7% leading to the increase in its welfare by 0.014% instead of its decline by 0.032%. In no redistribution case, the increase in the tariff revenue is explained by the increase in trade flow through Belarus. Belarus starts to import more from none-EACU countries and to export more to Russian Federation. As it was mentioned in Vashchilko (2017), the decrease in the tariff revenue of Belarus happened because of the decrease in the tariff revenue of EACU. At the same time, the decrease in the tariff revenue of EACU occurred because of the decline in the tariff revenue of Russian Federation, which resulted from the imposed ban on imports in Meat and Dairy Products Sectors. While introducing the ban on imports, Russian Federation deviated from the common tariffs.

As in Vashchilko (2017), the welfare of EU countries that used to export into Russian Federation decreased. Particularly, the welfare of Lithuania, Latvia, Germany, Poland went down by 0.029%, 0.023%, 0.016%, 0.011% correspondingly.

The trade war led to the reallocation of labor across sectors of a country. The induced by the trade war change in the labor share of the sectors of Russian Federation, Ukraine, and Italy is presented in Table (3).

The ban on imports within Meat and Dairy Products Sectors by Russian Federation and Ukraine led to the decrease in their imports within these sectors. To compensate for the

	Meat Products	Dairy Products	Apparel Products
Russian Federation	1.37%	-0.74%	-0.59%
Ukraine	-1.8%	1.4%	-9.2%
Italy	-0.06%	-0.01%	0.02%

Table 3: The effect of the trade war on the labor shares across sectors

decreased imports, the labor should move from Wearing Apparel Products Sector to Meat and Dairy Products Sectors of these countries to increase the output there. According to Table (3), the amount of labor employed in Wearing Apparel Products Sector of Russian Federation and Ukraine went down.

Ukraine imports from Russian Federation within Dairy Products Sector were equal to 119 million USD. At the same time, Ukraine imports from Russian Federation within Meat Products Sector were equal to 0.45 million USD. As result, the introduced ban on import from Russian Federation within these sectors negatively affected Dairy Products Sector and mainly did no affect Meat Products Sector. So, the labor in Ukraine moved to Dairy Products Sector to compensate for decreased imports by the increase in domestic production. Because of the bans on imports, the import within Meat Products Sector by Russian Federation decreased by 119 million USD. At the same time, the import within Dairy Products Sector by Russian Federation decreased by 77 million USD. So, the labor in Russian Federation moved into Meat Products Sector to compensate for the decrease in imports there by the increase in domestic production there.

Italy is EU member, which was affected by the ban on imports imposed by Russian Federation. The ban on imports imposed by Russian Federation led to the reduction in its exports and output within Meat and Dairy Products Sectors. The decrease in the output led to the decrease in the amount of labor employed in these sectors. According to Table (3), the labor moved from the affected sectors of Italy into Wearing Apparel Products Sector.

### 5.3 Adjustment of Tariffs

In this subsection, the adjustment of the tariffs in the sectors of EACU, where no ban on import was introduced, is discussed. Since in the current setup no ban on import was introduced in Wearing Apparel Products Sector, the 2% increase (from 10% to 12%) in the tariff within this sector of EACU is considered. The effect of this increase is analyzed under two scenarios. In the first case, we assume that the increase in the tariff happened before the initiation of the trade war. In the second case, we assume that the increase in the tariff happened after the initiation of the trade war. The starting point for this subsection is the tariffs and trade flows resulted from the formation of EACU, the accession of Ukraine to WTO and the formation of EU-Ukraine Deep and Comprehensive Free Trade Area.

The effects of the 2% increase in the tariff within Wearing Apparel Products Sector of EACU are presented in Table (4) and Table (5). The increases in the welfare of EACU countries occur in the case the 2% increase in tariff happens before trade war. Also, the increases in the welfare EACU countries occur in the case the 2% increase in tariff happens after the initiation of trade war. The increases in the welfare of EACU countries are explained by the initial value of the tariff in Wearing Apparel Products Sector of EACU being substantially less of its optimal value.

	$\Delta W$	$\Delta \tilde{w}$	$\Delta \tilde{\pi}$	$\Delta \tilde{R}$
Belarus	0.0018%	-0.0147%	-0.016%	10.9%
Russian Federation	0.033%	-0.0601%	-0.0497%	10.7%
Kazakhstan	0.007%	-0.0532%	-0.042%	10.7%
Ukraine	-0.02%	-0.011%	-0.014%	-1.1%
EU countries	-0.03 ÷ 0%	-0.012 ÷ 0%	-0.015 ÷ 0%	-1.45 ÷ -0.06%

$W$  - welfare,  $\tilde{w}$  - real wage,  $\tilde{\pi}$  - real profit,  $\tilde{R}$  - real tariff revenue

Table 4: The effect of the before trade war increase in the tariff within Wearing Apparel Products Sector of EACU

	$\Delta W$	$\Delta \tilde{w}$	$\Delta \tilde{\pi}$	$\Delta \tilde{R}$
Belarus	0.0006%	-0.0156%	-0.017%	13.2%
Russian Federation	0.03%	-0.0605%	-0.0489%	12.9%
Kazakhstan	0.0065%	-0.0537%	-0.0427%	13%
Ukraine	-0.007%	-0.005%	-0.005%	-0.37%
EU countries	-0.03 ÷ 0%	-0.012 ÷ 0%	-0.015 ÷ 0%	-1.65 ÷ -0.07%

$W$  - welfare,  $\tilde{w}$  - real wage,  $\tilde{\pi}$  - real profit,  $\tilde{R}$  - real tariff revenue

Table 5: The effect of the after trade war increase in the tariff within Wearing Apparel Products Sector of EACU

According to Table (4) and Table (5), the welfare of EACU countries increases by larger percentage in response to the increase in the tariff within Wearing Apparel Products Sector, if this increase happens before the initiation of the trade war. The main reason for this is that the real wage and the real profit decrease by smaller percentage in response to the increase in the tariff before the initiation of the trade war then they do in response to the increase in the tariff after the initiation of the trade war.

The increase in the tariff within Wearing Apparel Products Sector leads to the increase in prices in EACU countries within this sector. As result, the real wage decreases there. At the same time, the higher prices lead to higher profits of firms producing and selling domestically within Wearing Apparel Products Sector. The higher profits make firms there to increase output, which leads to the decrease in prices. As result, the initial decrease in the real wage becomes smaller.

Further, the size of the increase in the output in response to the increase in prices within Wearing Apparel Products Sector depends on if the 2% increase in tariff happens before or after the initiation of the trade war. In turn, the change in the output within this sector depends on the change in the employment there. In case the increase in the tariff happens after the initiation of the trade war, it will be more difficult to attract labor into Wearing Apparel Products Sector from the sectors of EACU directly affected by the trade war. The reason is that the employment of labor in the sectors of EACU directly affected by the trade war is crucial to compensate for the substantial reduction in imports there because of the trade war. According to Table (6), the share of labor employed in Wearing Apparel Products Sector of Russian Federation increases by 0.33% in the response to the 2% increase in the tariff occurred after the initiation of the trade war. At the same time, the same labor share increases by 0.56% in the response to the 2% increase in the tariff occurred before the initiation

of trade war.

	Meat Products	Dairy Products	Apparel Products
Before trade war	0.014%	-0.17%	0.56%
After trade war	0.037%	-0.12%	0.33%

Table 6: The effect of the increase in the tariff within Wearing Apparel Products Sector of EACU on the labor shares of Russian Federation

The increase in the tariff within Wearing Apparel Products Sector before the initiation of the trade war leads to the larger shift of labor toward this sector in response to the 2% increase in the tariff. The resulted larger increase in output there leads to the larger compensation for the initial decrease in the real wage. The decrease in the real wage by smaller amount leads to the larger increase in the welfare of EACU countries.

To summarize, the size of the responses of the welfare of EACU countries in Tables (4) and (5) depend on if the increase in the tariff within Wearing Apparel Products Sector of EACU occurred before or after the initiation of the trade war. The sign of the responses of the welfare of EACU countries is explained by the initial value of tariff within Wearing Apparel Products Sector of EACU being below the optimal level.

The things change when the initial value of the tariff within Wearing Apparel Products Sector of EACU is close to the optimal one. The sector with the tariff close to the optimal one will be referred to as protected one. In this case, the sign of the response depends on if the increase in tariff occurred before the initiation of the trade war or after the initiation of the trade war. Table (7) presents the results for Belarus from the increase in the tariff within Wearing Apparel Products Sector of EACU. The increase in the tariff from 13.5% to 15.5% (by 2%) is considered.

	$\Delta W$	$\Delta \tilde{w}$	$\Delta \tilde{\pi}$	$\Delta \tilde{R}$
Before trade war	0.0005%	-0.0133%	-0.0146%	7.7%
After trade war	-0.0005%	-0.0141%	-0.0156%	9%

Table 7: The effect of the increase in the tariff within protected Wearing Apparel Products Sector of EACU on Belarus

In the case of the increase in the tariff within protected sector of EACU, the change in the real tariff revenue becomes small and comparable to the responses of the real wage and the real profit in before and after trade war scenarios. Though the increase in the tariff before trade war leads to the increase in the welfare of Belarus, the after trade war increase in the tariff leads to the decrease in the welfare of Belarus. Before trade war, the decreases in the real wage and the real profit are small and do not completely compensate for the increase in the tariff revenue. As result, the welfare of Belarus increases. After trade war, the decreases in the real wage and the real profit are larger and do compensate for the increase in the tariff revenue. As result, the welfare of Belarus decreases. Similar results hold true for Kazakhstan.

According to Table (8), the response of the welfare of Russian Federation to the increase in the tariff within protected sector of EACU is different. The increase in the tariff from 23% to 25% (by 2%) causes the decrease in the welfare of Russian Federation if it happened before the trade war. The same increase in the tariff after the trade war causes the increase in the

welfare of Russian Federation. The reason is that the decrease in the real profit after the trade war is smaller than the decrease in real profit before the trade war. Within EACU, it holds true only for Russian Federation because of its direct participation in the trade war.

	$\Delta W$	$\Delta \tilde{w}$	$\Delta \tilde{\pi}$	$\Delta \tilde{R}$
Before trade war	-0.0002%	-0.043%	-0.04%	3.24%
After trade war	0.0002%	-0.0439%	-0.0394%	3.8%

Table 8: The effect of the increase in the tariff within protected Wearing Apparel Products Sector of EACU on Russian Federation

The companies in Meat and Dairy Products Sectors of Russian Federation are making good profits because of the ban on imports introduced there. They will try not to let labor to move to the Wearing Apparel Products Sector because of the increase in the wage resulted from the increase in the tariff there. As result, the real profit of Russian Federation decreases by smaller amount in response to the after trade war increase in the tariff within the Wearing Apparel Products Sector.

## 6 Conclusion

Both Ukraine and Russian Federation suffered from the trade war. The decrease in their welfare was accompanied by the transition of labor from none-affected sectors into ones with introduced bans on imports. At this point, it is clear that the removal of bans on imports in the trade between both countries would lead to the increase in their welfare. The welfare of Ukraine in this case will increase by 0.59%.

Two scenarios of the decrease in the tariff within the sector of EACU not directly affected by the ban on imports are considered. According to the first one, the decrease in the tariff occurs before the trade war. And according to the second one, the decrease in the tariff occurs after the trade war. The situation when the initial value of the tariff in the sector of EACU not affected directly by the ban on imports being slightly less of its optimal value is considered. This sector of EACU is identified as a protected one. Before trade war decrease in the tariff within this sector of EACU leads to the decrease in the welfare of EACU countries not affected directly by the trade war. At the same time, the after trade war decrease in the tariff there leads to the increase in the welfare of these countries.

As result, the decreases in the tariffs within protected sectors of EACU should have been implemented after the initiation of the trade war. It would have had the positive effect on the welfare of EACU countries not involved directly into the trade war and counterbalanced the negative effect from the trade war on these countries. Such reduction in the tariffs would not have been objected by the countries outside EACU. Yet, the mentioned decreases in the tariffs would have had the negative effect on Russian Federation. Russian Federation was directly affected by the trade war. Because of this, the decreases in the tariffs within protected sectors of EACU would have affected Russian Federation differently than the other EACU countries.

Further research is required to identify the protected sectors of EACU within which the tariffs should be decreased.

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