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# **RUSSIAN AGRICULTURAL IMPORT BAN: QUANTIFYING LOSSES OF GERMAN AGRI-FOOD EXPORTERS**

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# **RUSSIAN AGRICULTURAL IMPORT BAN: QUANTIFYING LOSSES OF GERMAN AGRI-FOOD EXPORTERS**

## **Abstract**

This paper is a back-of-the-envelope attempt to assess the losses that German agri-food exporters encountered due to the Russian import ban that was introduced in August 2014 and recently has been extended for at least one more year. Looking at exports in a time-series perspective it is shown that exporters' losses due to the boycott itself are not that severe if two earlier episodes of rather drastic export reductions are taken into account: first, due to Russian import restrictions of meat and milk products in 2013 and second, due to an increased uncertainty in European-Russian trade relations as the Ukrainian conflict escalated and sides exchanged the very first sanctions. The results suggest that although the import ban had a negative impact on German agri-food exports to Russia, its extent was not as large as one may guesstimate without considering a broader picture of trade barriers imposed by Russia on German exporters in the recent years.

## **Keywords**

Sanctions, import ban, Russia, Germany, agri-food exports

## **1 Introduction**

Sanctions are no modern instrument of expressing a discontent about some party's actions, they can be traced back to ancient Greece. As time went by, sanctions did not give up their status of being important yet controversial foreign policy tool (HUFBAUER et al. 2007). Last century provided us with at least two hundred new episodes of economic and political sanctions (see e.g. ABBOT and PAARLBERG 1986; DAOUDI and DAJANI 1983; YANG et al. 2009).

A recent escalation of the Ukrainian conflict and the Russian involvement in it resulted in a wave of sanctions that started in March 2014 with personal sanctions imposed by the US and some European states against certain Russian and Crimean officials responsible for destabilization of the situation in the Ukraine and a suspension of a collaboration with the Russian Federation in some spheres, including defense, space and investment construction. The list of subjects to 'personal' sanctions has been expanding since then and in July sectoral sanctions were introduced by the US (aiming at mining industry and financial sector) and the EU (that also included sanctions against energy service sector, defense industry and civil aviation). On its turn, Russia reacted with the Decree No. 560 from 06.08.2014 "On the application of certain special economic measures to ensure the security of the Russian Federation" that announced an import boycott of a number of agri-food products (including dairy, meat products, fruits and vegetables and fish, among the others) from these countries. In June 2015 the import ban that targets the US, the EU, Norway, Canada and Australia was extended for another year.

While the question whether the Western sanctions will reach its goals in the Ukrainian conflict remains yet unanswered, European agri-food producers and exporters already feel the pressure of the Russian response. Prices of agricultural goods have dropped drastically on many domestic markets, pushed down by an excess supply due to the closing of an important

export market for domestic producers (e.g. dairy sector in Germany) or due to an increased supply within European countries that had to reallocate their non-exported products across neighbors (e.g. Polish apples and their impact on apple prices in Germany), contributing to large declines in real agricultural income per worker (up to -37.6% in Germany, see EUROSTAT 2015) and calling forth farmers' support measures from the government side.

This study aims at quantifying export losses due to the Russian export boycott and at framing these losses in the context of other non-tariff barriers (NTB) imposed by the Russian side in the recent years. The analysis is carried out using an example of German agri-food sector, since Russia has been a very important destination for many agricultural products, especially meat and dairy. Furthermore, even with agri-food trade being a minor part of total bilateral trade, Germany is one of the largest exporters of agri-food products among European countries; hence the impact of sanctions might be one of the highest in absolute terms.

Results suggest that although some agri-food sectors are affected by the import ban (as exports of milk products or seasonings), an overall instability of Russian economy and its involvement in geo-political conflicts as well as its unclear policy with respect to sanitary and phytosanitary (SPS) measures damage exports much more than the ban itself, at least for the case of Germany. The spillover effects of the NTBs imposed by the Russian side also affect sectors beyond the scope of SPS measures or the boycott.

## 2 Empirical Strategy and Data

### 2.1 Empirical Specification

As a starting point let us assume that exports (here: German agri-food exports to Russia) can be modelled in a reduced-form export demand equation:

$$(1) \text{Export}_t = \beta_0 + \beta_1 ER_t + \beta_2 FD_t + \Gamma + \mathbf{Z} + \varepsilon_t, \text{ where}$$

- *Export* refers to a value of agricultural and food products exported from Germany to Russia at time  $t$ ;
- *ER* stands for real exchange rate measured as Rubles per 1 Euro and corrected by differences in price levels between Russia and Germany, log;
- *FD* represents foreign demand and is approximated by the Russian index of industrial production, log;
- $\Gamma$  is a vector of deterministic parameters of the model including seasonal effects and a linear trend;
- $\mathbf{Z}$  is a set of slope dummies that capture effects of different trade restricting activities from the Russian side, including Russian import restrictions for milk and meat products in late January, February and early March 2013 (*Feb2013*), a possible negative effects that might emerge as European countries imposed the first wave of sanctions on Russia in March 2014 (*Mar2014*) and, finally, the effect of Russian import boycott that was introduced in August 2014 (*Aug2014*).

As I work with time-series data, Equation (1) represents the long-term relationship between variables of the model if variables are stationary (I(0)) or nonstationary (I(1)) but cointegrated. To avoid spurious regression, a unit root testing is conducted prior to estimation of Equation (1). Should variables be of I(1) order of integration, a two-stage error-correction model (ECM) is estimated. The first stage equation is the long-run relation represented by Equation (1). If cointegration test applied to residuals of the first stage suggests their stationarity implying that variables are cointegrated, the second stage equation is estimated:

$$(2) \Delta Export_t = \gamma_0 + \gamma_1 \varepsilon_{t-1} + \sum_{n=0} \Delta ER_{t-n} + \sum_{n=0} \Delta FD_{t-n} + \sum_{n=1} \Delta Export_{t-n} + u_t$$

Equation (2) models short-term dynamics (lag structure determined by means of the Schwartz criterion) and the speed of adjustment of the system to its long-run equilibrium. In this study, effects of sanctions, hence the outcomes of the first stage are in focus.

## 2.2 Data

The analysis covers a time span from January 1999 to August 2015, thus focusing on the period of a post-default Russia and Germany that have already introduced Euro. Export data comes from Eurostat. Harmonized System (HS) data is used for exports since this classification is similar to the one implemented by Russia. Table 1 describes variables that enter the empirical specification.

**Table 1: Description of variables**

| Variable          | Description  | Source          |
|-------------------|--|-----------------|
| <i>Export</i>     | Export value, Euro, not CPI- or seasonally adjusted two- and four-digit HS groups. Monthly data.               | Eurostat        |
| <i>ER</i>         | Real exchange rate: nominal EUR/RUB adjusted by $CPI_{de}/CPI_{ru}$ , log. Monthly data.                       | Eurostat; OECD  |
| <i>FD</i>         | Foreign demand: the Russian index of industrial production, log. Monthly data.                                 | OECD            |
| <i>Trend</i>      | Linear trend   | Own compilation |
| <i>Seas2...12</i> | Seasonal dummy that takes a value of 1 in a respective month and 0 otherwise. January is the reference period. | Own compilation |
| <i>Feb2013</i>    | Dummy. Takes a value of 1 from February 2013 on and is 0 otherwise.  | Own compilation |
| <i>Mar2014</i>    | Dummy. Takes a value of 1 from March 2014 on and is 0 otherwise  | Own compilation |
| <i>Aug2014</i>    | Dummy. Takes the value of 1 starting in August 2014 on and is 0 otherwise.                                     | Own compilation |

On the first stage of the analysis aggregated two-digit HS groups (01-23) are analyzed. Two groups (HS10-Cereals and HS14-Vegetable planting material) are dropped from the empirical part as they contain a lot of missing data. Only a part of considered groups – including meat, fish and milk products, fruits and vegetables as well as meat and cereal preparations – is directly affected by the Russian import boycott. Yet, since economic sanctions might have spillover effects also to the groups that are not indicated as a subject to import restrictions, it is useful to test whether other German agri-food exports to Russia were affected prior and during the sanctions. These spillovers can be negative (due to increasing instability of the Russian market) or positive (due to substitution effects), while for export groups that were directly targeted by trade restrictions I expect to see a statistically significant negative effect of sanctions on exports. Table 2 provides descriptive statistics of export values across two-digit groups.

Since two-digit groups are highly aggregated and only a partial import ban was imposed on some of these groups, the effect of sanctions might be blurred due to data aggregation and possible within-group substitutions between exports of restricted and not restricted products. On the second stage of the analysis, the focus is shifted to four-digit exports and only exports that were included in the list of banned products are considered.

**Table 2: Descriptive statistics: two-digit HS product groups (Export values, Euro)**

|           | HS01    | HS02     | HS03     | HS04     | HS05     | HS06     | HS07     |
|-----------|---------|----------|----------|----------|----------|----------|----------|
| Mean      | 1658381 | 23806308 | 269376   | 14921543 | 1780276  | 321844   | 779384   |
| Median    | 833552  | 21489952 | 201741   | 13893159 | 1798067  | 168136   | 341522   |
| Maximum   | 8231182 | 62108181 | 1901897  | 36770900 | 7655117  | 2420815  | 9828993  |
| Minimum   | 0       | 0        | 0        | 1852324  | 65416    | 160      | 185      |
| Std. Dev. | 1895151 | 14710879 | 274822   | 7323895  | 1040375  | 438050   | 1264365  |
| Obs.      | 200     | 200      | 200      | 200      | 200      | 200      | 200      |
|           | HS08    | HS09     | HS11     | HS12     | HS13     | HS15     | HS16     |
| Mean      | 1085537 | 1479352  | 2030810  | 3901863  | 2391985  | 3077693  | 706428   |
| Median    | 763623  | 1407957  | 1391663  | 2522559  | 2063552  | 2325946  | 494084   |
| Maximum   | 4116895 | 4665752  | 7752041  | 18600360 | 9676330  | 10977468 | 4249906  |
| Minimum   | 42199   | 136700   | 180814   | 549638   | 85496    | 684358   | 24083    |
| Std. Dev. | 953357  | 939899   | 1668032  | 3859618  | 1696020  | 2013681  | 719922   |
| Obs.      | 200     | 200      | 200      | 200      | 200      | 200      | 200      |
|           | HS17    | HS18     | HS19     | HS20     | HS21     | HS22     | HS23     |
| Mean      | 1110158 | 5665042  | 4941388  | 2120767  | 13632625 | 6531155  | 4944372  |
| Median    | 1045055 | 4273515  | 4433551  | 2123441  | 13940888 | 6237828  | 5022304  |
| Maximum   | 5548963 | 21933561 | 13509475 | 4700903  | 28055796 | 19660967 | 15021291 |
| Minimum   | 23777   | 555168   | 780261   | 426187   | 1778479  | 436582   | 292897   |
| Std. Dev. | 712315  | 4731633  | 2631876  | 829509   | 6412475  | 4501799  | 3084878  |
| Obs.      | 200     | 200      | 200      | 200      | 200      | 200      | 200      |

Notes: HS01 - Live animals; HS02 - Meat and edible meat offal; HS03 - Fish and crustaceans, molluscs and other aquatic invertebrates; HS04 - Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included; HS05 - Products of animal origin, not elsewhere specified or included; HS06 - Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage; HS07 - Edible vegetables and certain roots and tubers; HS08 - Edible fruit and nuts; peel of citrus fruit or melons; HS09 - Coffee, tea, mate and spices; HS11 - Products of the milling industry; malt; starches; inulin; wheat gluten; HS12 - Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder; HS13 - Lac; gums, resins and other vegetable saps and extracts; HS15 - Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes; HS16 - Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates; HS17 - Sugars and sugar confectionery; HS18 - Cocoa and cocoa preparations; HS19 - Preparations of cereals, flour, starch or milk; pastrycooks' products; HS20 - Preparations of vegetables, fruit, nuts or other parts of plants; HS21 - Miscellaneous edible preparations; HS22 - Beverages, spirits and vinegar; HS23 - Residues and waste from the food industries; prepared animal fodder.

Since 32 out of 48 four-digit banned export groups include a lot of missing observations (especially fish products, vegetables and fruits), these exports are omitted from the analysis. Descriptive statistics of 16 remaining groups are reported in Table 3.

It is important to notice that exports of chilled beef (HS0201), poultry (HS0207) and fresh milk and cream (HS0401) dropped to zero already in February 2013 - when Russia imposed trade restrictions on imports of fresh German meat and poultry - and never recovered ever since. For these products one should not expect any additional effects due to sanctions of 2014.

Finally, the WTO SPS data suggests that Russia issued an emergency notification that targeted German exports of chilled pork, beef and poultry at the end of January 2013. This measure was followed by a ban of meat and milk products from three German regions in February 2013 and another emergency notification for a whole bunch of exports from the Brandenburg area that was lifted at the end of 2013. These three episodes are captured by *Feb2013* variable.

**Table 3: Descriptive statistics: four-digit HS product groups (Export values, Euro)**

|           | HS0201  | HS0202   | HS0203   | HS0207  | HS0304  | HS0401 | HS0403  | HS0404   |
|-----------|---------|----------|----------|---------|---------|--------|---------|----------|
| Mean      | 1569872 | 3821422  | 9199728  | 2158423 | 68703   | 156115 | 613101  | 227017   |
| Median    | 1303737 | 1892691  | 5032034  | 1928976 | 63189   | 145562 | 262257  | 181386   |
| Maximum   | 7434878 | 37779573 | 35985345 | 8461859 | 366354  | 820908 | 3456753 | 1258916  |
| Minimum   | 0       | 0        | 0        | 0       | 0       | 0      | 0       | 0        |
| Std. Dev. | 1494774 | 5755037  | 8961433  | 1754799 | 53089   | 122689 | 804739  | 214604   |
| Obs.      | 200     | 200      | 200      | 200     | 200     | 200    | 200     | 200      |
|           | HS0405  | HS0406   | HS0712   | HS0802  | HS0813  | HS1601 | HS1901  | HS2106   |
| Mean      | 603118  | 12089789 | 111311   | 81089   | 273950  | 79012  | 2136079 | 7673729  |
| Median    | 375449  | 11526895 | 104021   | 67807   | 219870  | 56953  | 1885936 | 8430936  |
| Maximum   | 7579095 | 29947396 | 400277   | 362650  | 1083660 | 961235 | 6176406 | 17789297 |
| Minimum   | 0       | 10665    | 0        | 0       | 1529    | 0      | 472959  | 626965   |
| Std. Dev. | 809663  | 6747871  | 81839    | 60114   | 231024  | 86450  | 1001278 | 4516262  |
| Obs.      | 200     | 200      | 200      | 200     | 200     | 200    | 200     | 200      |

Notes: HS0201 - Meat of bovine animals, fresh or chilled; HS0202 - Meat of bovine animals, frozen; HS0203 - Meat of swine (pork), fresh, chilled or frozen; HS0207 - Meat and edible offal of poultry, fresh, chill or frozen; HS0304 - Fish, dried, salted or in brine; smoked fish, whether or not cooked before or during the smoking process; flours, meals and pellets of fish, fit for human consumption; HS0401 - Milk and cream, not concentrated nor containing added sugar or other sweetening matter; HS0403 - Buttermilk, curdled milk and cream, yogurt, kephir and other fermented or acidified milk and cream, whether or not concentrated or containing added sugar or other sweetening matter or flavoured or containing added fruit, nuts or cocoa; HS0404 - Whey, whether or not concentrated or containing added sugar or other sweetening matter; products consisting of natural milk constituents, whether or not containing added sugar or other sweetening matter, not elsewhere specified or included; HS0405 - Butter and other fats and oils derived from milk; dairy spreads; HS0406 - Cheese and curd; HS0712 - Dried vegetables, whole, cut, sliced, broken or in powder, but not further prepared; HS0802 - Other nuts, fresh or dried, whether or not shelled or peeled; HS0813 - Fruit, dried, other than that of headings 08.01 to 08.06; mixtures of nuts or dried fruits of this Chapter; HS1601 - Sausages and similar products, of meat, meat offal or blood; food preparations based on these products; HS1901 - Malt extract; food preparations of flour, groats, meal, starch or malt extract, not containing cocoa or containing less than 40 % by weight of cocoa calculated on a totally defatted basis, not elsewhere specified or included; food preparations of goods of headings 04.01 to 04.04, not containing cocoa or containing less than 5 % by weight of cocoa calculated on a totally defatted basis, not elsewhere specified or include; 2106 - Food preparations not elsewhere specified or included.

### 3 Results

#### 3.1 Unit Root Testing

As time-series data are used, I start the analysis with testing for the order of integration of variables by means of the Augmented Dickey-Fuller (ADF) test. The  $H_0$  of the ADF test is a unit root, hence variable is stationary once the null hypothesis is rejected and assumed to be nonstationary if  $H_0$  cannot be rejected. Test-statistics is reported in Table 4 for all variables. To make sure that nonstationary variables are I(1), not I(II), the procedure is repeated for variables in first differences. In this case,  $H_0$  of a unit root is rejected for all series.

The exchange rate and foreign demand variables are clearly I(1). For the case of exports, the overall picture is mixed. Test results suggest that some exports are stationary, while others have a unit root.

Since there are two I(1) variables on the right-hand side of the equation – the exchange rate and foreign demand, the combination of which might also be stationary, I proceed with all the export groups and estimate a two-step error-correction model. Once residuals of the first stage of the ECM are stationary, one may conclude that variables are cointegrated and results of the first stage are long-run parameters of the export demand model.

**Table 4: ADF test results**

| Variable<br>(export group) | Test<br>statistic | Degree of<br>integration | Variable<br>(export group) | Test<br>statistic | Degree of<br>integration |
|----------------------------|-------------------|--------------------------|----------------------------|-------------------|--------------------------|
| Export HS 01               | -4.704            | I(0)                     | Export HS 0201             | -3.303            | I(0)                     |
| Export HS 02               | -2.634            | I(1)                     | Export HS 0202             | -3.178            | I(0)                     |
| Export HS 03               | -7.307            | I(0)                     | Export HS 0203             | -3.257            | I(0)                     |
| Export HS 04               | -2.872            | I(1)                     | Export HS 0207             | -1.374            | I(1)                     |
| Export HS 05               | -2.484            | I(1)                     | Export HS 0304             | -2.439            | I(1)                     |
| Export HS 06               | -6.523            | I(0)                     | Export HS 0401             | -2.787            | I(1)                     |
| Export HS 07               | -6.005            | I(0)                     | Export HS 0403             | -1.153            | I(1)                     |
| Export HS 08               | -1.164            | I(1)                     | Export HS 0404             | -2.752            | I(1)                     |
| Export HS 09               | 0.553             | I(1)                     | Export HS 0405             | -4.428            | I(0)                     |
| Export HS 11               | -3.900            | I(0)                     | Export HS 0406             | -2.575            | I(1)                     |
| Export HS 12               | -1.586            | I(1)                     | Export HS 0712             | -3.753            | I(0)                     |
| Export HS 13               | -1.643            | I(1)                     | Export HS 0802             | -10.308           | I(0)                     |
| Export HS 15               | -4.968            | I(0)                     | Export HS 0813             | -2.290            | I(1)                     |
| Export HS 16               | -3.845            | I(0)                     | Export HS 1601             | -6.541            | I(0)                     |
| Export HS 17               | -4.065            | I(0)                     | Export HS 1901             | -2.945            | I(0)                     |
| Export HS 18               | -0.073            | I(1)                     | Export HS 2106             | -1.797            | I(1)                     |
| Export HS 19               | -1.429            | I(1)                     |                            |                   |                          |
| Export HS 20               | -2.411            | I(1)                     |                            |                   |                          |
| Export HS 21               | -2.192            | I(1)                     |                            |                   |                          |
| Export HS 22               | -1.570            | I(1)                     | Ln( <i>ER</i> )            | -2.531            | I(1)                     |
| Export HS 23               | -1.630            | I(1)                     | Ln( <i>FD</i> )            | -2.305            | I(1)                     |

Notes: \* refers to a rejection of a respective  $H_0$  at the 5% level.  $H_0$  of the ADF test: Variable has a unit root. Critical value for the 5% level is -2.876 (MacKinnon 1996). HS groups defined as in Tables 2 and 3.

### 3.2 Two-digit exports

As the effect of the Russian import boycott (August 2014) and presumably negative effects of overall destabilizing factors as setting sanctions in general (as during the first wave of sanctions in March 2014) or introducing a temporary import restriction on some exports (as in February 2013) are of particular interest, Table 5 reports selected results from the estimated ECMs. The Engel-Granger test suggest that all the residuals of the estimated first-stage equations are stationary, thus variables are cointegrated and one may proceed to the second stage to estimate the short-term dynamics and the speed of adjustment to a long-run equilibrium. The first-stage coefficients are long-run parameters and as I did not take a logarithm of export values, coefficients related to the NTB dummies can be directly interpreted as export losses in Euro.

To visualize the results, I plot the value of German export losses related to the sanitary and phytosanitary issues of 2013 and the two waves of sanctions in 2014 (Figure 1). The net losses are depicted, which implies that gains received by some industries are added to the sum of losses. The losses themselves are, hence, somewhat higher in absolute terms than those reported in the figure. A brief look at it suggests that an additional negative effect of import boycott in August 2014 is relatively modest compared to export reductions in 2013 and in early 2014. Figure 2 plots the distribution of these losses across two-digit exports. One clearly sees that meat and milk exports are hit the most as Russia forbids imports of chilled meat and raw milk products in February 2013. Other product groups that experience some decline are products of animal origin (HS 05), edible preparations of meat (HS 16), fruits and nuts (HS 08), followed by lacs, gums and resins (HS 13). Meat and milk products undergo another reduction of exports in March 2014 as the situation between Russia and Europe becomes instable due to the Ukraine crisis. This time exports of cocoa products (HS 18), cereal preparations (HS 19), animal feed (HS 23), as well as preparations of vegetables, fruits and nuts (HS 20), edible preparations of meat (HS 16) and live trees (HS 06) exports decline.

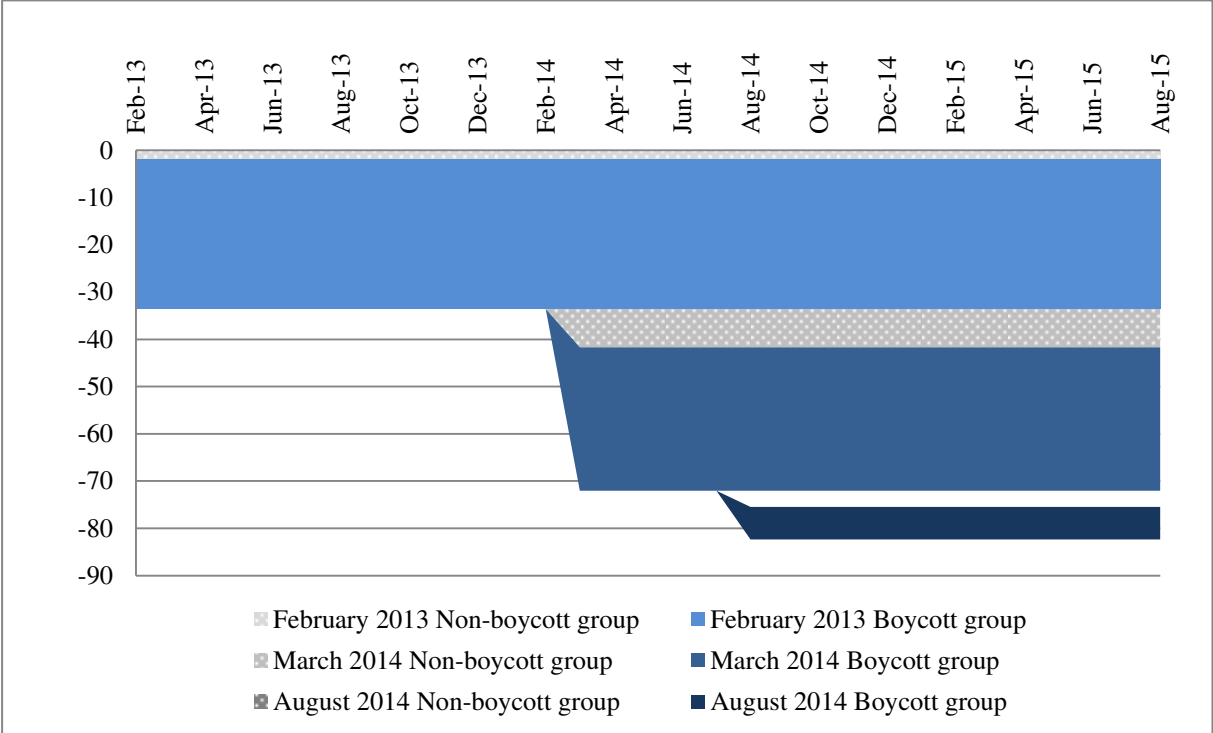


**Table 5: Selected results from the first stage of the ECM: Two-digit exports**

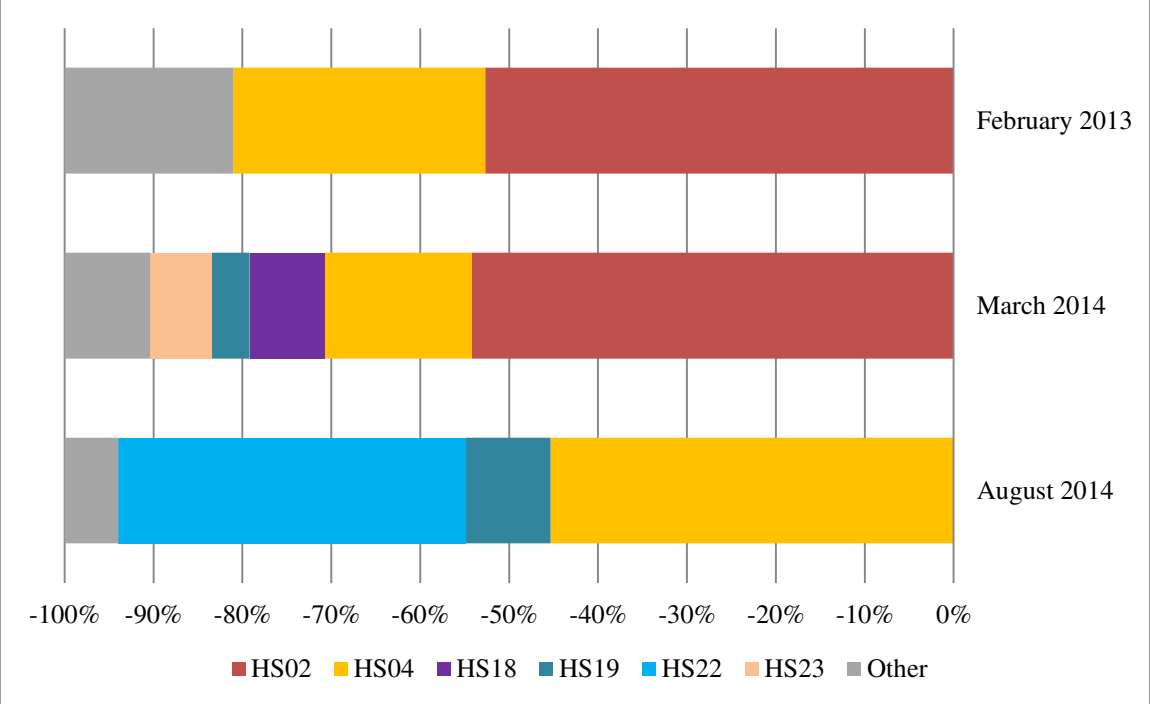
|      | <i>Feb2013</i>         |     | <i>Mar2014</i>         |     | <i>Aug2014</i>        |     | Adj. R <sup>2</sup> | EG-test |
|------|------------------------|-----|------------------------|-----|-----------------------|-----|---------------------|---------|
| HS01 | -1418914<br>(387873)   | *** | 923463<br>(356981)     | **  | 427631<br>(450465)    |     | 0.34                | -5.88   |
| HS02 | -20013399<br>(2559713) | *** | -21347559<br>(2805100) | *** | -3863712<br>(2957090) |     | 0.65                | -7.38   |
| HS03 | -3369<br>(69696)       |     | 75917<br>(78047)       |     | -99956<br>(71467)     |     | 0.32                | -9.88   |
| HS04 | -10767879<br>(1381658) | *** | -6522986<br>(1188105)  | *** | -5127267<br>(1203571) | *** | 0.68                | -7.16   |
| HS05 | -1121601<br>(187179)   | *** | -39008<br>(191817)     |     | 545490<br>(203081)    | *** | 0.53                | -5.97   |
| HS06 | -129631<br>(68234)     | *   | -353375<br>(116299)    | *** | 100573<br>(128098)    |     | 0.31                | -6.83   |
| HS07 | -1044608<br>(333600)   | *** | 183504<br>(379257)     |     | -260370<br>(407520)   |     | 0.31                | -6.49   |
| HS08 | -777994<br>(144331)    | *** | -601349<br>(189608)    | *** | -421005<br>(220234)   | *   | 0.62                | -5.49   |
| HS09 | 280309<br>(130788)     | **  | -293750<br>(276777)    |     | 270023<br>(342322)    |     | 0.85                | -9.95   |
| HS11 | 1613490<br>(316740)    | *** | 349507<br>(369883)     |     | 582573<br>(402502)    |     | 0.45                | -8.06   |
| HS12 | 1095938<br>(1026400)   |     | 1620469<br>(1785220)   |     | 1281147<br>(1758890)  |     | 0.49                | -9.95   |
| HS13 | -1430486<br>(344814)   | *** | -551664<br>(311184)    | *   | 89410<br>(306578)     |     | 0.54                | -5.42   |
| HS15 | -173040<br>(531695)    |     | 538010<br>(455090)     |     | -177328<br>(541266)   |     | 0.36                | -7.11   |
| HS16 | -1284119<br>(198236)   | *** | -195787<br>(97653)     | **  | -262761<br>(133055)   | **  | 0.46                | -5.67   |
| HS17 | 369329<br>(140242)     | *** | 221434<br>(149604)     |     | -36002<br>(131179)    |     | 0.57                | -11.43  |
| HS18 | -398729<br>(970829)    |     | -3321573<br>(926896)   | *** | 1116622<br>(1291619)  |     | 0.78                | -7.31   |
| HS19 | 2156386<br>(442510)    | *** | -1677375<br>(421491)   | *** | -1077145<br>(599763)  | *   | 0.87                | -8.84   |
| HS20 | 15721<br>(146163)      |     | -611441<br>(185071)    | *** | 449945<br>(199994)    | **  | 0.60                | -6.84   |
| HS21 | 1257306<br>(847096)    |     | 1309556<br>(1697030)   |     | -1807203<br>(1840715) |     | 0.81                | -8.99   |
| HS22 | 588431<br>(595622)     |     | -1478775<br>(541829)   | *** | -4423840<br>(721885)  | *** | 0.87                | -7.20   |
| HS23 | -425829<br>(795885)    |     | -2729573<br>(786692)   | *** | 550407<br>(603873)    |     | 0.79                | -12.86  |

Notes: White standard errors reported in parenthesis. \*\*\*, \*\*, \* refer to statistical significance at a 1, 5 and 10 percent level. EG-test: H<sub>0</sub>: no cointegration. Critical value from Davidson and Mackinnon (1993) at 5% is -3.78. Results shaded in blue refer to product groups that were partially or completely banned by Russia from being imported from Germany in August 2014. HS groups defined as in Table 2. Results, which are not reported in the Table, include coefficients related to the real exchange rate, index of industrial production (FD), a linear trend, and a set of seasonal dummies.

**Figure 1: Export losses across aggregated boycott and non-boycott groups of agricultural exports (Million Euro)**



**Figure 2: Distribution of export losses between individual two-digit groups**



Notes: HS02 - Meat and edible meat offal; HS04 - Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included; HS18 - Cocoa and cocoa preparations; HS19 - Preparations of cereals, flour, starch or milk; pastry cooks' products; HS22 - Beverages, spirits and vinegar; HS23 - Residues and waste from the food industries; prepared animal fodder. Product groups that accounted for less than 4% export losses in the respective period summed up to the category "Other".

To the point when Russia declared its import ban, Germany did not export any fresh meat to the country, thus there are no large export losses due to the August 2014 sanctions for meat. Milk product exports, on the other side, reduced substantially, especially cheese products, curd and butter. This trade reduction is however smaller in absolute terms than export losses due to events of 2013 and the early 2014. Surprisingly, exports of beverages dropped significantly since the introduction of sanctions, even though beverages do not belong to the banned products. This reduction was due to decreased exports of high-degree spirits that might be attributed to an overall decline of demand for luxury goods as Russia entered recession together with a general deterioration of trade between countries. Finally, even though the regression outcomes suggest that some export groups benefit from sanctions, these benefits are very moderate and include just a few sectors, for example milling industry products and cereal preparations.

### 3.3 Four-digit exports

Table 6 reports selected outcomes for four-digit exports. The  $H_0$  of no cointegration for the HS0403 could not be rejected and the results for this group are not discussed in the following.

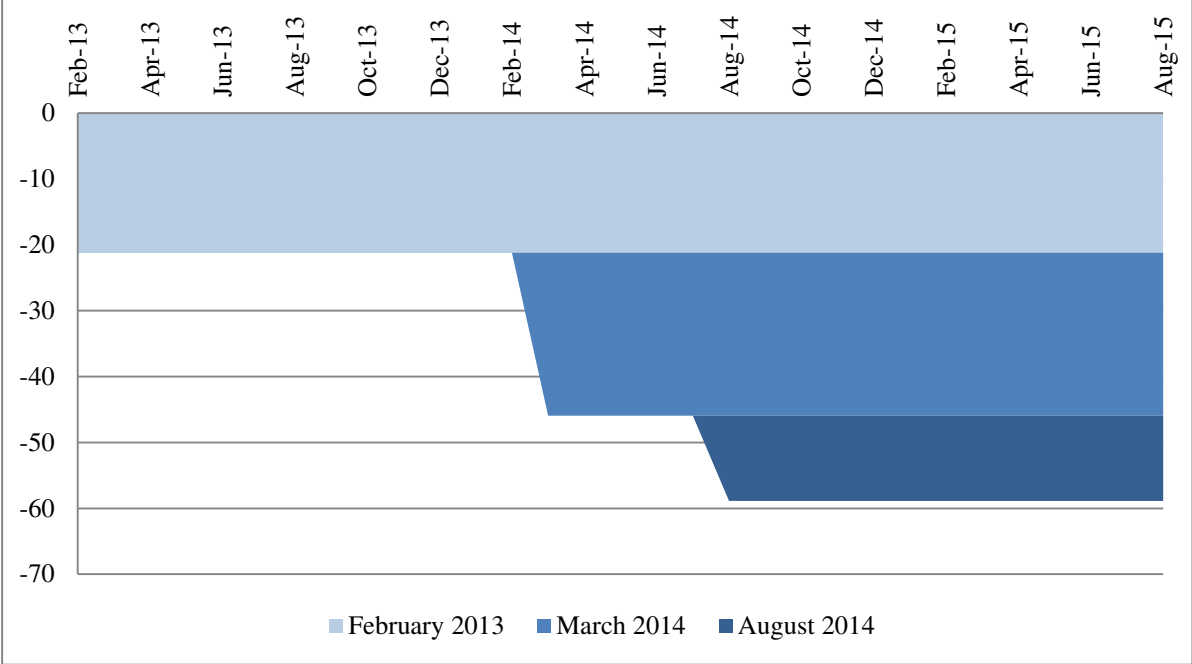
**Table 6: Selected results from the first stage of the ECM: Four-digit exports**

|               | February 2013              | March 2014                 | August 2014               | Adj. R <sup>2</sup> | EG-test |
|---------------|----------------------------|----------------------------|---------------------------|---------------------|---------|
| <u>HS0201</u> | -654911 *<br>(362335)      | 641067<br>(567876)         | 916841<br>(598638)        | 0.52                | -5.57   |
| HS0202        | 14081<br>(502509)          | 2427193 ***<br>(540910)    | -1524837 **<br>(626841)   | 0.42                | -5.85   |
| HS0203        | -7932829 ***<br>(2101737)  | -19136730 ***<br>(2059320) | -3891639 ***<br>(1325693) | 0.68                | -6.67   |
| <u>HS0207</u> | -2501166 ***<br>(435472)   | 38907<br>(248238)          | 247902<br>(293550)        | 0.44                | -4.28   |
| HS0304        | -13250<br>(9420)           | 10456<br>(9670)            | 21215 *<br>(11393)        | 0.45                | -13.60  |
| <u>HS0401</u> | -285444 ***<br>(24184)     | -10848<br>(16528)          | 14532<br>(18164)          | 0.59                | -5.07   |
| HS0403        | 619383 ***<br>(106000)     | 242682 *<br>(140730)       | -131079<br>(167977)       | 0.51                | -3.50   |
| HS0404        | -127736 ***<br>(38371)     | -13409<br>(30283)          | -7554<br>(38490)          | 0.49                | -7.66   |
| HS0405        | -76716<br>(139935)         | -560920 ***<br>(205158)    | -124840<br>(206078)       | 0.09                | -4.50   |
| HS0406        | -10712344 ***<br>(1187653) | -6145311 ***<br>(1016418)  | -3868592 ***<br>(928845)  | 0.77                | -7.71   |
| HS0712        | 20462<br>(22639)           | 15792<br>(22730)           | -84546 ***<br>(21033)     | 0.32                | -4.48   |
| HS0802        | 28490 *<br>(16286)         | 11575<br>(16937)           | -105158 ***<br>(14251)    | 0.29                | -14.31  |
| HS0813        | 70822<br>(68131)           | -274023 ***<br>(66031)     | -301527 ***<br>(40651)    | 0.65                | -12.45  |
| HS1601        | -65723 ***<br>(18530)      | 14085<br>(28059)           | 23740<br>(37620)          | 0.14                | -11.02  |
| HS1901        | 1051257 ***<br>(274224)    | -1043925 ***<br>(289397)   | -378816<br>(290367)       | 0.67                | -8.90   |
| HS2106        | 1967<br>(647795)           | -220258<br>(998695)        | -3190315 ***<br>(1178185) | 0.80                | -3.85   |

Notes: White standard errors reported in parenthesis. \*\*\*, \*\*, \* refer to statistical significance at 1, 5 and 10 percent level. EG Test  $H_0$ : no cointegration. Critical value from Davidson and Mackinnon (1993) at 5% is -3.78. HS groups defined as in Table 3. Results, which are not reported in the Table, include coefficients related to the real exchange rate, index of industrial production (FD), a linear trend, and a set of seasonal dummies.

As expected, for the groups HS0201 (chilled beef), HS0207 (poultry) and HS0401 (fresh milk and cream) there are no additional effects of *Mar2014* or *Aug2014* as these exports were practically cut after the first import ban imposed in February 2014. The only implausible (positive) result (although significant only at 10 % level) for the import ban effect is the outcome for the group HS0304 (Fish, dried, salted or in brine). As above, I plot the export losses due to the three episodes of trade disturbances (Figure 3).

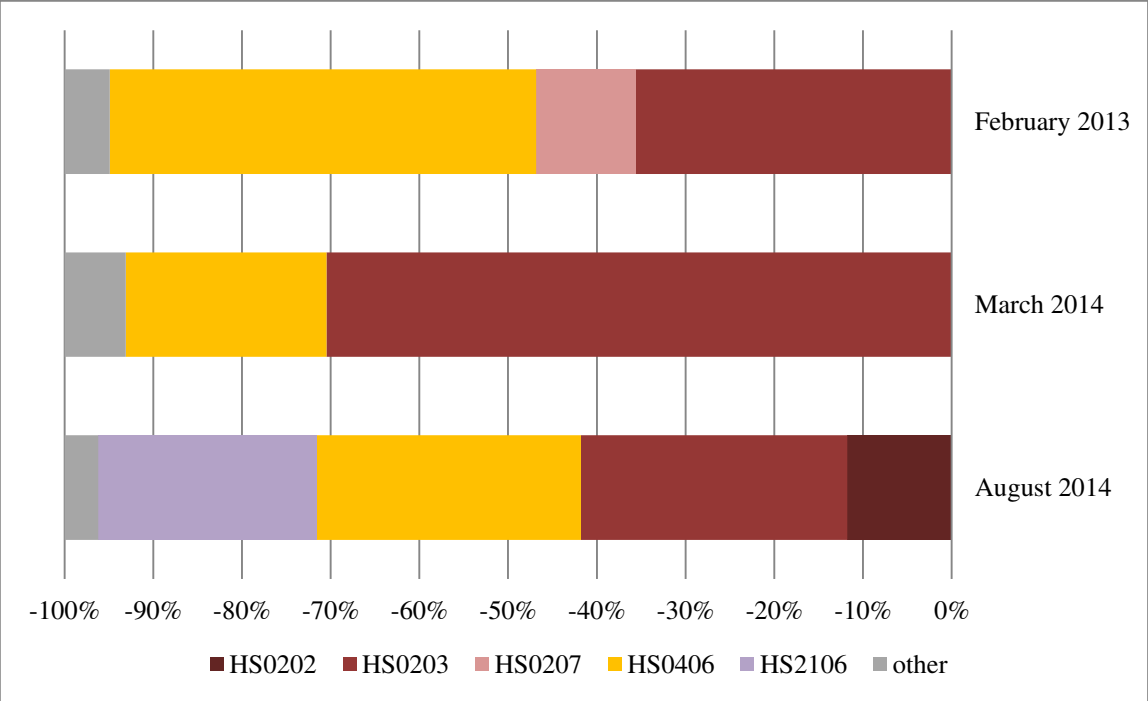
**Figure 3: Aggregated export losses across four-digit product groups banned by Russia (Million Euro)**



In this Section, I only deal with products that were actually banned from being imported to Russia in August 2014. The estimates of export losses due to disturbances in February 2013 and March 2014 are now smaller in absolute terms than in case of two-digit exports. This is plausible as exports of the non-banned groups were also negatively affected by an increasing instability of German-Russian trade relations. On the other hand, the aggregate estimate of export losses due to the import ban in August 2014 is higher than in case of two-digit data. This is also reasonable, since individual effects could be blurred by data aggregation in the two-digit aggregated groups. Finally, it is possible that some of negative effects that were captured in the aggregated two-digit groups were partially lost when date was transformed to a four-digit level. This has to do with missing data that made me omit 32 groups of products, which were traded less frequently than on a monthly basis, and to focus on 16 four-digit groups that had a break-free time series. Figure 4 plots the distribution of export losses due to sanctions.

Export losses due to February 2013 SPS measures are – unsurprisingly - due to chilled beef (HS 0201), pork (HS 0203), poultry (HS 0207) and cheese products (HS 0406). The “March 2014”-related losses were caused mostly by decreased exports of pork, butter, cheese and malt extract. As already mentioned above, by the time the Russian agricultural import ban was imposed, Germany exported almost no meat to Russia, thus sanctions resulted in the stopped exports of frozen beef (HS 0202), frozen pork (0203) and cheese (HS 0406) and a decline in exports of food preparations (HS 2106) as well as preparations of fruits and vegetables.

**Figure 4: Structure of export losses across individual four-digit groups**



Notes: HS0202 - Meat of bovine animals, frozen; HS0203 - Meat of swine (pork), fresh, chilled or frozen; HS0207 - Meat and edible offal of poultry, fresh, chill or frozen; HS0406 - Cheese and curd; 2106 - Food preparations not elsewhere specified or included.

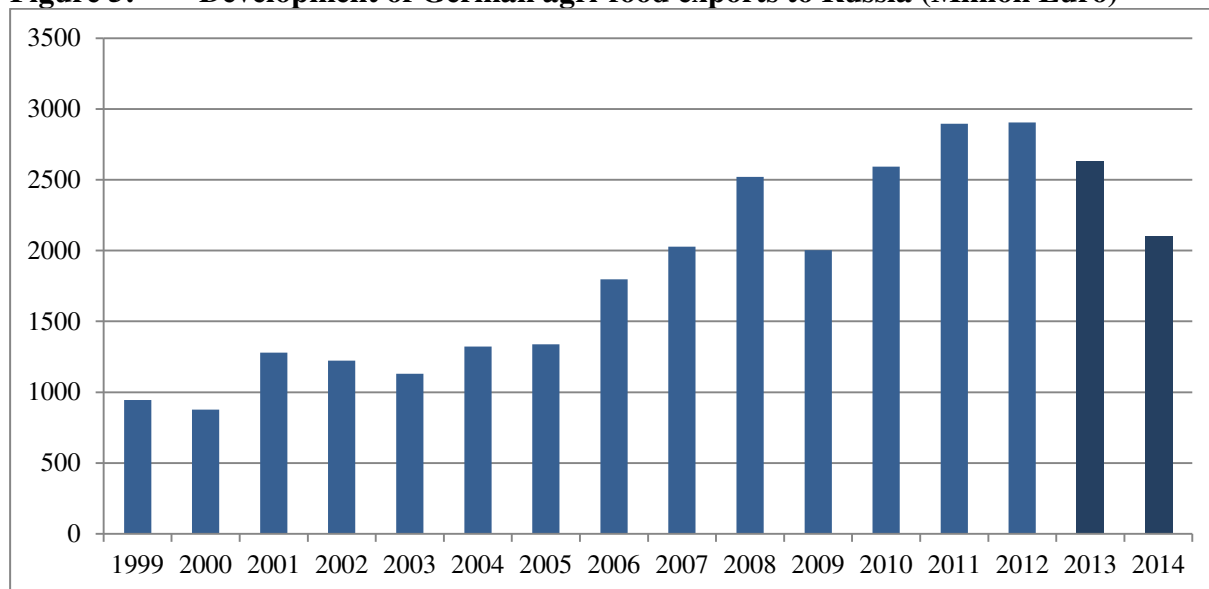
**4 Discussion and concluding remarks**

German agri-food exports to Russia have been growing steadily during 2000s slowing down just once in the crisis year 2009 (Figure 5). Exports more than doubled between 1999 and 2011. However after reaching their peak in 2012, exports started to reverse. In the Results section, I showed that this decline in exports can be explained by a number of restrictive measures that Russia imposed on German exports in 2013 and 2014. For instance, milk and meat industry were harmed the most by these restrictions, although I could identify other sectors that also reacted by a substantial export drop despite not being directly affected by the prohibitive measures.

Comparing effects of an earlier import ban in 2013 with the export reduction related to a deterioration of economic relations between the two countries due to an increasing uncertainty of Russian geo-political and economic position and with the effect of the import boycott itself, it was shown that the import ban has caused less damage to German agri-food sectors than other trade restricting actions. This having said, one should underline that the boycott too, resulted in losses, also in the industries that were never involved into trade restrictions before, like food preparations (see e.g. USDA 2014). Additionally, price pressure of not realized exports has been hard especially for the German diary sector (DIERIG 2015).

Now that the import boycott is extended to an additional year, the question how to mitigate the negative effect of the boycott on German and overall European agri-food sector becomes very relevant. Other industries as well – even those that have nothing to do with agriculture, such as machinery (GEIGER 2014) – face an important question what to do with the goods that were meant for Russia in a situation when exports to Russia are uncertain due to a whole number of issues: falling oil prices, the devaluating Ruble, an unleashing recession, active involvement in various geo-political conflicts and overall deteriorating trade relations, amplified by the import ban.

**Figure 5: Development of German agri-food exports to Russia (Million Euro)**



This question is driven by more than a mere speculation, as a reduction in the overall German exports to Russia is driven by declining trade in industrial goods, not covered by the import ban (CHRISTEN et al. 2015). Searching for alternative markets might be one of the keys for the long-term success (e.g. BMEL 2014). Those exporters who were affected the first might have had an important strategic advantage of becoming first movers on new, dynamic and perspective markets, being that Northern Africa, Middle East or Eastern Europe. Also the further away destinations: Latin American countries, China, India and other South Asian countries that experience a much higher growth than the countries of Western Europe and North America might become a matter of strategic considerations (e.g. CHRISTANELL 2014). Given a rather modestly (un)successful performance of most European countries, including Germany, in entering these markets and securing a niche for European agri-food products, a revision of the quality standards and an active work on trade agreements with these countries are acutely needed. These measures might help Europe not only to overcome negative effects of the Russian import ban but to secure its agri-food exports in the future.

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