Impact Assessment of the Russian Boycott on Spain

M. Alejandro Cardenete and M. Carmen Delgado*

Department of Economics, Loyola University Andalusia
Campus Palmas Altas, 41014 Seville, Spain

Abstract: Since the Russian government took action to ban the import of most food, agricultural and livestock products from countries that had supported economic sanctions against Russia for its role in the Ukraine conflict, a dangerous new phase has opened in trade relations between Russia and the boycotted countries, among which is Spain. In this scenario, the Social Accounting Matrix (SAM) approach is applied for Spain with a highly disaggregated agricultural sector for the year 2013 as basis for Input Output Tables (IOT). This study uses linear multipliers models in which we exogenously shock the demand of any combination of endogenous activities in the original SAM in to assess the impact of the Russian boycott on Spain in the year 2014.

Keywords: Agricultural Social Accounting Matrix; Linear Multiplier Model; Impact Analysis.

JEL Classification Number: C68, E16, F1

1. Introduction

In August 2014, Russia prohibited the import of all perishable food from Spain and several other countries that had adopted sanctions against Moscow for its role in the crisis in Ukraine. The measure affects most of the producers in the European Union, which is Russia's main trading partner. In 2013, EU agricultural exports to Russia were approximately 12,000 million euros, while such exports from Spain were more than 400 million euros.

A priori with this scenario, Spanish vegetable exports will be the most affected sector. For two reasons the Spanish meat industry will hardly notice the new situation -most exports go to other EU countries, and the European pig had already been banned in Russia-. The structure of the remainder of this paper is as follows: The second section contains the methodology used and the main features of the model. The third presents the different simulation scenarios raised, the sharing rule for Spanish exports to Russia and the results. Finally, concluding remarks are found in the fourth section.

2. The Model

This research work applies the methodology of linear multipliers models to study the impact of the Russian boycott on Spain. The multiplier theory was initiated by Stone

* Corresponding Author.

(1962) and Pyatt and Round (1979) and subsequently developed through other studies, such as that of Defourney and Thorbecke (1984). These methods are based on inverse matrices, derived from the models of Leontief (1941) and Ghosh (1958), and applied to the SAM, showing the effect on increasing demand or costs by sector. More recent works using this methodology are Mairnar et al. (2012), Llop and Manresa (2014) and Cardenete and Delgado (2014).

Following Cardenete et al. (2010), we begin with a brief explanation of these models, as an extension of the Leontief Model. A square nxn matrix is considered, where each row and column represent an economic account (productive sectors, consumers, government, capital, etc.) that satisfies the accounting equations of the economy (where total income equals total expenditure). Each Y_{ij} component of the matrix represents the bilateral flow between account i and account j. Each row of the SAM reflects the total income that row i receives from column j; each column shows the total income of column j and how it is distributed among the different i rows. The average expenditure coefficients: $a_{ij} = Y_{ij} / Y_j$, $i, j=1 \ldots n$, show the payments made to account i for every income unit of j. From this definition it is possible to obtain:

$$Y_i = \sum_{j=1}^{n} \left(\frac{Y_{ij}}{Y_j}\right) Y_j = \sum_{j=1}^{m} a_{ij} Y_j + \sum_{j=m+1}^{m+k} a_{ij} Y_j , \qquad n = m + k \quad (1)$$

Indexes m and k represent the division of the SAM accounts into endogenous and exogenous accounts, which leads to the division of the nxn matrix into four submatrices: A_{mm}, A_{mk}, A_{km}, and A_{kk}. Y_m and Y_k denote the total income of the endogenous and exogenous accounts, respectively. Therefore, it is possible to work out the value of Y_m from $Y_m = A_{mm} Y_m + A_{mk} Y_k$, and then, following the same procedure as with the Leontief equation, calculate the extended multipliers matrix from $Y_m = (I - A_{mm})^{-1} Z$, where Z is the vector of exogenous accounts[1] and $(A_{mk} Y_k)$ and $M = (I - A_{mm})^{-1}$ is the extended multipliers matrix in the SAM. These multipliers can be interpreted as the input requirements by unit increases of expenditure or income (depending on whether columns or rows are considered) in an account, as in the so-called inverse Leontief matrix, with the difference that this matrix reflects the relationship between production, the factors' income, income distribution and final demand. It is important to note that the selection of m (i.e., the decision regarding which accounts are endogenous) usually depends on the type of analysis undertaken, which determines which accounts (exogenous) are the ones explaining the variation of the income in other accounts (endogenous). If changes in the vector of exogenous accounts

[1] Submatrix Amk represents how the income flows from the exogenous accounts are distributed among the endogenous accounts.

are denoted as *dZ*, then changes in the income of the endogenous accounts will be expressed as:

$$dY_m = MdZ = Md(A_{mk}\,Y_k) = MA_{mk}\,dY_k \qquad (2)$$

The i^{th} column in M indicates the total income generated in each of the endogenous accounts when a unit of income flows from the exogenous institutions towards endogenous account i. In the model simulation, the new vector is obtained by subtracting from vector Z all of the injections of income from the Spanish exports to Russia by the different branches of activity.

3. Results

The Russian boycott in Spain will cause losses in the Spanish primary sector. Spanish exports to Russia in 2013 that would be affected by the boycott totaled 442 million euros, which includes fresh vegetables and fruits (FVEG) (354 million euros), dairy products (1.86 million euros), red and white meat (86.2 million euros) and fish (0.15 million euros).

Two scenarios were created to conduct the impact analysis: Scenario 1 (S1): With the Russian boycott the full amount of exports from Spain to Russia is eliminated and the affected sectors are: fresh vegetables and fruits, dairy products, red and white meat and fish. Scenario 2 (S2): With the Russian boycott only the 60 % of exports from Spain to Russia are eliminated and the affected sector is fresh vegetables and fruits. Next we present the results for both scenarios. The first table shows the total impact and the second the impact on impacted accounts, both in terms of total output and gross domestic product (GDP)[2].

Table 1: Impact Assessment in Total Accounts (Million of Euros)

Scenario	Size of the shock	Total impact in total output	Total impact in terms of GDP
S1	-443	-843.22	-501.28
S2	-250	-429.86	-294.76

Source: Authors.

Table 1 shows the total impact on each scenario. The results after the shock show a fall in production/income of 843 million euros in the S1 and 430 million euros in the S2, reaching a GDP loss of 501 million euros in the S1 and 295 million euros in the S2. Table 2 shows the impact of the boycott by account for both scenarios in terms of production. In

[2] SimSIP SAM software (Simulations for Social Indicators and Poverty) created by the World Bank in 2009 is applied in the experiment.

the first scenario surprisingly the highest impact is for meat with a reduction of the total Spanish output of 3.5%, followed by a 2.4% drop in total output for vegetables and fruits. In the second scenario, where only the vegetables and fruits sector is impacted, the fall in production/income is 251 million euros, amounting to a drop in total output of 1.7%.

Table 2: Impact Assessment in Impacted Accounts (Million of Euros)

Scenario	Code	Size of the shock	Total impact in total output	% change in total output after shock
S1	FVEG	-354	-356.89	-2.44
	FISH	-0.15	-1.13	-0.04
	DAIRY	-1.86	-4.41	-0.04
	MEAT	-86.2	-88.09	-3.53
S2	FVEG	-250	-251.34	-1.72

Source: Authors.

4. Conclusions

In this paper, we quantify the losses that Spanish sectors can be expected to have after the Russian boycott of exported agricultural products. Using the linear multipliers model, we find important losses to the Spanish economy as a result of this boycott. We find that if all Spanish agricultural exports to Russia are eliminated, Spain's production/income falls 843 million euros and the GDP suffers a loss of 501 millions euros. The meat sector is the most affected by the Russian boycott with a reduction of its total output of 3.5%, although, as we noted, the main destination for meat exports is the EU countries and the European pig had already been banned in Russia. We find that production in the vegetables and fruits sector will drop by 2.4%. Another case study is the S2, where we see how only a 60% elimination of exports from Spain to Russia leads to a production loss of 430 million euros and a GDP loss of 295 million euros. All these results point to a remarkable negative impact on the Spanish economy generated by the Russian boycott, which will force companies in these sectors to search for new markets to offset the economic loss.

References

Cardenete, M.A., Delgado, M.C., 2014, ¿Cómo influye el sector exterior en la economía andaluza? Revista Información Estadística y Cartografía de Andalucía 4, 262-269.

Cardenete, M.A., Fuentes, P., Polo. C., 2010, Análisis de sectores clave a partir de la matriz de contabilidad social de Andalucía para el año 2000, Revista de Estudios Regionales 88, 15-44.

Defourney, J. and Thorbecke, E., 1984, Structural Path Analysis and Multiplier Decomposition within a Social Accounting Matrix framework, The Economic Journal, 94, 111-136.

Ghosh, A., 1958, Input-Output Approach in Allocation System, Economica, 25, 58-64.

Leontief, W., 1941, The Structure of American Economy, 1919-1924: An Empiriocal Application of Equilibrium Analysis, Harvard Univ. Press, Cambridge, Mass.

LLop, M. and Manresa, A., 2004, Comparing the aggregation bias in the input–output model and the social accounting matrix model, Applied Economics Letters, 21(11), 795-800.

Mainar, A., Fuentes, P. and Cardenete, M.A., 2012, Endogenization of the 'rest of the world' account in SAM linear models: an approach based on Miyazawa, Applied Economics Letters, 19, 1723-1726.

Parra J.C. and Wodon, G., 2009, SimSIP SAM: A Tool to Analyse Social Accounting Matrices, mimeo, The World Bank, Washington, DC.

Pyatt, G. and Round, J.I., 1979, Accounting and fixed price multipliers in a Social Accounting Matrix framework, The Economic Journal 89 (356), 850-873.

Stone, R. 1962, A Social Accounting Matrix for 1960: A Programme for Growth, Chapman and Hall Ltd. (Eds.), London.