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# Evidence on Euromediterranean Trade Integration: The Case of German Olive Oil Imports

## Nachweis über euromediterrane Handelsintegration: das Beispiel deutscher Olivenölimporte

Aikaterini Kavallari, Sarah Maas and P. Michael Schmitz  
Justus-Liebig-Universität Gießen

### Abstract

*The deepening of the Barcelona Agreement and the discussions of the creation of a Mediterranean Union has awakened the interest of the non-EU Mediterranean countries to expand their exports to the European markets. This study analyses the factors that influence the German imports of olive oil by employing a gravity model. The results of two random-effects models corrected for serial correlation and heteroskedasticity suggest that being a Mediterranean Partner Country of the European Union has the highest impact on trade flows to Germany, thus supporting further Euromediterranean trade integration. Moreover, olive oil exports to Germany are positively related to the existence of direct marketing channels and to tourism. Therefore, these variables should be explored more in the future by the Mediterranean countries so as to boost their exports.*

### Key words

*Euromediterranean trade integration; gravity model; olive oil; Germany*

### Zusammenfassung

*Die Vertiefung des Barcelona-Abkommens und die Diskussion über die Gründung einer Mittelmeerunion haben das Interesse der mediterranen Drittländer geweckt, ihre Exporte an den europäischen Markt auszubauen. Diese Studie analysiert daher die Determinanten der deutschen Olivenölimporte an Hand eines Gravitationsmodells. Im Mittelpunkt steht hierbei die Frage, ob der Abschluss des Barcelona-Abkommens zu einer Stimulierung des Handels zwischen Deutschland und den mediterranen Drittländern geführt hat. Die Ergebnisse zweier Random-Effects-Modelle, korrigiert für Autokorrelation und Heteroskedastizität, zeigen, dass die Zugehörigkeit zu den mediterranen Partnerländern den stärksten Einfluss auf die Exporte nach Deutschland hat und unterstüt-*

*zen somit eine weitere Handelsintegration im euromediterranen Raum. Zudem ist der Handel mit Deutschland positiv mit dem Bestehen von direkten Absatzwegen und Tourismus verknüpft. Diese Einflussfaktoren sollten in Zukunft stärker von mediterranen Ländern genutzt werden, um ihre Olivenölexporte nach Deutschland auszuweiten.*

### Schlüsselwörter

*euromediterrane Handelsintegration; Gravitationsmodell; Olivenöl; Deutschland*

## 1. Introduction

Olive oil is a typical Mediterranean commodity and is considered as an important agricultural product of the countries surrounding the Mediterranean basin. More than 95% of the world production takes place in the Mediterranean countries with the EU member states being the largest producers accounting for about 75% of the world production (EUROSTAT, various years). Non-EU and non-Mediterranean countries account only for about 1% of the world production. Traditionally olive oil has been consumed in these producing countries while Italy, followed by Spain, France and Greece dominate olive oil trade with Italy being the largest importer worldwide (ANANIA and PUPO D'ANDREA, 2008). According to EUROSTAT data the non-EU Mediterranean countries export olive oil almost only to the EU markets (more than 75% of their olive oil exports were destined to the EU-15 over the last ten years) with Italy again being the largest importer, followed by France and Spain.

In recent years due to campaigns for a healthier way of living the consumption of olive oil has increased in non-traditional markets, providing space for the Mediterranean countries to expand their market shares to new destinations. The interest of the Mediterranean countries and especially of the non-EU

**Table 1. Imports of Olive Oil (HS 1509) in Germany**

Partner country	Average share in %					Average growth in % over	
	1995-1997	1998-2000	2001-2003	2004-2006	2007	1995-2000	2000-2005
Italy	84.4	87.2	86.9	77.8	71.2	14.3	9.3
Spain	10.2	6.7	6.4	10.6	9.6	-3.2	28.8
Greece	3.0	2.7	3.2	7.8	13.0	15.2	36.7
France	1.5	1.3	1.7	2.0	2.4	6.2	22.7
Rest of EU-27	0.6	1.9	1.6	1.5	2.9	36.7	12.4
Turkey	0.2	0.2	0.1	0.2	0.5	-18.4	61.0
Tunisia	0.0	0.0	0.1	0.0	0.1	n.a	n.a
Rest of MPCs	0.1	0.0	0.0	0.0	0.0	-19.5	47.6
Rest of world	0.0	0.0	0.0	0.1	0.2	17.3	58.8
Total imports (in € million)	64.5	88.9	120.0	183.6	213.6		

Notes: n.a: not available

Source: EUROSTAT; own calculations

Mediterranean countries to expand their market shares in the EU member states is expected to become more obvious as the relationships with the EU are becoming deeper with the Barcelona Process<sup>1</sup> and the updated discussions for the creation of a Mediterranean Union. Germany with round 82 million inhabitants is one of the largest markets in Europe and thus an attractive export destination of olive oil. An analysis of the supply chain of olive oil in Germany has shown that the popularity of the commodity is growing but still the market is dominated by Italian imports (FLATAU et al., 2007).

Objective of this study is to stress the factors that influence the German imports of olive oil and specifically to identify whether trade has been stimulated by the formation of the Barcelona Agreement. Within this framework, the next section gives an overview of the German olive oil market and the development of olive oil trade flows. The economic importance of the driving factors for the export to Germany is measured by applying a gravity model, described in the third Section of the paper. The findings of the analysis that follow in the fourth part could serve to form further options for the trade policy of the Mediterranean countries, as discussed in the last Section of the paper.

## 2. German Market of Olive Oil

Due to natural production limitations, the olive oil supply on the German market is entirely covered by imports, mostly originating from the Mediterranean basin. In fact, Germany's olive oil imports tripled within the past decade (see table 1), thus rendering the German market a potentially important export destination for Mediterranean olive oil producers. During recent years the imports are dominated by Italy (about 71% of the total olive oil imports in 2007), followed by Greece and Spain (13% and 10% in 2007, respectively) (EUROSTAT, various years). The MPCs altogether account only for 0.4% of the German imports with Turkey as the distinguishing country (0.1% in 2007 according to EUROSTAT data).

In the first five years after the conclusion of the Barcelona Agreement the average growth of the MPCs olive oil exports to Germany was negative (-18.4% for Turkey and -19.4% for the rest of the MPCs) as table 1 shows. Nevertheless, after 2000 the countries have performed better and the average growth rate of their olive oil exports over the period 2000-2005 is the highest among other olive oil exporters, indicating a positive development of Mediterranean exports to Germany. In detail, the average growth of German olive oil imports from Turkey over this period of time was 61% and 47.6% from the rest of MPCs. This positive performance which could be due to the deepening of the Barcelona Agreement is expected to continue over the coming years both because of the entry into full force of this Agreement as well as because of the implementation of the new market organisation for olive oil in the European Union (OJ L 161, 30.04.2004: 97-127). Moreover, ANANIA and

<sup>1</sup> The Barcelona Agreement was signed in 1995 between the EU and the Mediterranean countries: Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, the Palestinian Authority, Syria, Tunisia, and Turkey. Apart from Cyprus and Malta, which are already member states of the European Union these countries are called hereafter Mediterranean Partner Countries (MPCs).

PUPO D'ANDREA (2008) expect slower production rates in the EU Mediterranean countries due to decoupling support for olive oil which was introduced in the 2004 reform which is likely to increase import demand from non-EU Mediterranean countries.

Overall, due to the structure and the growing importance of trade flows between Germany and Mediterranean countries, the German olive oil market appears particularly interesting for analysing the effects of the Barcelona Agreement on Euromediterranean trade integration.

### 3. The Gravity Model and its Empirical Application

One of the most commonly used tools to examine and explain trade flows is the application of the gravity equation on the exports (imports) of commodities between two or more countries. It is based on the idea that the traded volumes from origin  $i$  to destination  $j$  can be explained by the economic size of the origin and of the destination country and any other forces, specific for the examined trade flow, that attract or not bilateral trade.

The basic formulation of the gravity equation is as in equation 1.

$$(1) \quad PX_{ij} = \beta_0 (Y_i)^{\beta_1} (Y_j)^{\beta_2} \left(\frac{Y_i}{Pop_i}\right)^{\beta_3} \left(\frac{Y_j}{Pop_j}\right)^{\beta_4} (Dist_{ij})^{\beta_5} (A_{ij})^{\beta_6} e_{ij}$$

where  $i$  and  $j$  to denoted trade partners and for  $i < j$  and  $j=1,2,3,\dots,n$  and where:

$PX_{ij}$	value of trade flow (import to or export from) from country $i$ to country $j$
$Y_i, Y_j$	nominal GDP of country $i$ , nominal GDP of country $j$
$Pop_i, Pop_j$	population of country $i$ and of country $j$
$Dist_{ij}$	distance between countries $i$ and $j$
$A_{ij}$	dummy variables
$e_{ij}$	error term

It should be noted that in the literature it seems that there is no agreement about the second measure of "masses" and thus the measurement is given either by population or by GDP per capita (CARDAMONE, 2007).

The gravity equation has been first proposed by TINBERGEN (1962) and PÖYHÖNEN (1963) and ever since applied by a number of authors to explain international trade flows due to migration, foreign direct

investment or the existence of preferential trade agreements. Reviews of gravity modelling exercises of regional trade agreements are given for example by CARDAMONE (2007) and GREENAWAY and MILNER (2002). Although it is commonly accepted that the gravity equation has performed well in empirical analyses, its application is seen as controversial. ANDERSON and VAN WINCOOP (2003) note that due to lack of theoretical foundation variables are omitted and thus the results of the gravity models are biased. Moreover, the authors argue that the estimated parameters cannot be used for comparative static exercises. ANDERSON (1979) was the first to derive the gravity equation from a model assuming product differentiation and his attempt has been followed by further authors, as for example by BERGSTRAND (1985 and 1989), DEARDORFF (1998), and ANDERSON and WINCOOP (2003). Further in the studies of MÁTYÁS (1997 and 1998) and EGGER (2000 and 2002) the econometric specification of the gravity equation has been improved and the advantages of the application of panel data methodology were drawn.

Gravity models have been applied only in limited cases to explain trade flows of particular commodities. EMLINGER et al. (2006) have built a gravity model for fruits and vegetables to analyse their access to EU markets, while VLONTZOS and DUQUENNE (2008) have applied the gravity equation to examine the trade flows of Greek olive oil. These approaches have the advantage of avoiding inconsistencies due to aggregating trade flows at country level as described in AGOSTINO et al. (2007).

In this application, the gravity equation explaining Germany's imports of olive oil is specified as

$$(2) \quad lPX_{Gj} = \beta_0 + \beta_1 lY_G + \beta_2 lY_j + \beta_3 l\left(\frac{Y_G}{Pop_G}\right) + \beta_4 l\left(\frac{Y_j}{Pop_j}\right) + \beta_5 lDist_{Gj} + \beta_6 rer_{Gj} + \sum_h \gamma_h D_{Gjh} + e_{ij}$$

where  $G$ =Germany and  $l$  denotes natural logs.

In the above equation  $\sum_h \gamma_h D_{Gjh}$  represents the sum of the dummy variables, which are mainly based on the findings of the analysis of the German supply chain of olive oil that preceded this study (FLATAU et al., 2007) as well as on the studies of VLONTZOS and DUQUENNE (2008) and GARCIA ÁLVAREZ-COQUE and MARTÍ SELVA (2006). More precisely, the dummy variables define whether

- immigrants of the exporting countries live in Germany (if the number of immigrants is below 1 % of total immigrants living in Germany the dummy is set to zero, above the threshold the dummy equals one. The immigrants number is retrieved from the German statistical yearbooks (Statistisches Bundesamt, various years));
- exporting countries are EU member states;
- exporting countries are partner countries of the EU (within the Barcelona Agreement);
- German tourists visit exporting countries (this variable is relevant only for olive oil producing countries, not for re-exporters and again if the number of tourists is below 100,000 of total German tourists that stay at least one night in the place they are visiting, the dummy is set to zero, above the threshold the dummy equals one. The respective number of tourists is retrieved from the German statistical yearbooks (Statistisches Bundesamt, various years));
- German supermarket chains buy directly from producers-traders of the exporting countries (as for instance Lidl which directly imports from Italy, see Flatau et al. (2007));
- the exporting countries sell mostly labelled and packaged olive oil (instead of bulk).

Following MARTINEZ-ZARZOSO and NOWAK-LEHMAN (2004) the real bilateral exchange rate index  $rer_{Gj}$  has been calculated by multiplying the nominal exchange rate of the exporting country (i.e. local currency value of one unit of country  $j$ 's currency value) with the GDP deflator of the export country divided by the GDP deflator of Germany. It should be noted that this relationship does not include export subsidies and ad-valorem tariffs since they are not applied. According to the TRAINS database, non-tariff trade barriers have not been reported for the examined period. As a result it was not possible to quantify non-tariff measures and to include them in the modelling exercise. Consequently, to our information all MPCs face the same (zero) tariff no heterogeneity of preferences among MPCs exists. This allows to proxy EU-Mediterranean trade integration using a dummy variable for MPCs which is not the case if the degree of protection varies among MPCs (see EMLINGER et al., 2008).

It is expected that the coefficients for the nominal GDP for both the importing and the exporting countries will be positive since a higher income level is

associated with higher imports and exports, despite the fact that the gravity equation is applied in a disaggregated commodity level. AGOSTINO et al. (2007) investigated whether the commodity level aggregation scheme is a source of bias for assessing preferential trade schemes and found that both on the aggregated and disaggregated commodity level the GDP was on average important in explaining trade flows. Moreover, studies of EMLINGER et al. (2006) and VLONTZOS and DUQUENNE (2008) show that the GDP coefficient is significant in explaining trade flows on a disaggregated product level (i.e. olive oil as well as fruits and vegetables), which as well supports the above expectation. The coefficient of the per capita income of the importer could be either positive or negative depending on whether the imported commodities are considered as necessities or luxury goods (MARTINEZ-ZARZOSO and NOWAK-LEHMAN, 2004). Also the sign of the coefficient of the per-capita income of the exporter cannot be anticipated a priori as it depends on the capital-labour ratio (BERGSTRAND, 1989). The distance coefficient, as a proxy for transaction costs (including transport costs) should be negative whereas the coefficients of the dummy variables are expected to be positive.

Data on German imports of olive oil are obtained from the EU's External Trade Statistics over the period 1995-2006. After excluding countries with zero bilateral trade flows the dataset covers 14 exporting countries.<sup>2</sup> Regarding GDP and per capita GDP (based on Purchasing Power Parity) the data are extracted from the World Economic Outlook database of the International Monetary Fund (IMF). Measures for distance are expressed as straight lines between cities using a City Distance Calculator.<sup>3</sup> Instead of computing the distances between capitals as it is the common practise, distances between the main trade centres and Hamburg are used as most importers of olive oil in Germany are located in Hamburg (FLATAU et al., 2007). Instead of the geographical distance, NOWAK-LEHMAN et al. (2007) and MARTINEZ-ZARZOSO and NOWAK-LEHMAN (2004) use two indices to capture transport costs, the freight index and transport index, focusing not only on terrestrial infrastructure but on

<sup>2</sup> The countries included in the model are: Austria, Belgium, France, Greece, Israel, Italy, the Netherlands, Portugal, Spain, Sweden, Switzerland, Turkey, UK, and USA.

<sup>3</sup> The city distance tool of <http://www.geobytes.com> has been used.

seaports. Although this approach would be welcomed as more precise, it has not been followed due to lack of data on the transport channels of olive oil into Germany.

The estimation makes use of panel data methodology which allows accounting for individual heterogeneity across countries. As focus is given on time-constant variables, such as the Mediterranean Partnership, the random effects (RE) approach is considered as more appropriate instead of a fixed effects model. However, to ensure that the assumptions of the RE model hold (i.e. orthogonality of the individual effects and the regressors) a Hausman test is carried out, which fails to reject the null hypothesis of no correlation between the individual effects and the regressors (GREENE, 2008; JOHNSTON and DiNARDO, 2007).

To ensure that the estimates do not suffer from serial correlation or heteroskedasticity, the Durbin-Watson statistic modified by BHARGAVA et al. (1982) and the Breusch-Pagan test adjusted to the panel data context are used, respectively. Both tests strongly indicate the presence of serial correlation and heteroskedasticity. Based on the test results two RE models corrected for serial correlation and heteroskedasticity are estimated by employing panel-corrected standard errors (PCSE) and Generalized Least Squares (GLS).

#### 4. Estimation Results

In general, the statistical tests indicate that the gravity equation has a rather good explanatory power over German imports of olive oil. Moreover, almost all coefficients have the expected sign and are statistically significant. The detailed results, reported in table 2, show that the differences among PCSE and GLS are only minimal.

The coefficient of the exporters' GDP is statistically significant and has a positive sign implying that the income of the exporting countries has a positive impact on olive oil exports to Germany. In contrast, while the coefficient of Germany's GDP has a negative sign and is statistically significant only in the GLS estimation. The GDP coefficients are smaller than one indicating that large economies trade more olive oil than small ones. However, trade increases less than proportionally with an increase of the country's economic size. As expected, the elasticity of GDP per capita has a statistically significant positive sign for the exporting countries, whereas the GDP coefficient for Germany is negative. This somewhat surprising result implies that olive oil is not consi-

dered a luxury good by German consumers, which can be attributed to the nutrition habits of the German consumers (MARTINEZ-ZARZOSO and NOWAK-LEHMAN, 2004).

The highest value has the coefficient of the dummy variable for MPCs, which suggests that preferential trade agreements between the EU and Mediterranean countries have the intended effect of enhancing Euromediterranean trade integration. The results show that being an MPC enhances olive oil exports to the German market by about 6%. More precisely, the market shares of MPCs on the German olive oil market are, on average, 6% higher than those of non-MPC olive oil producers. Unfortunately, the analysis does not allow distinguishing between trade creation and trade diversion effects meaning that increasing Euromediterranean trade integration has potential adverse effects on non-Mediterranean olive oil exporters which do not benefit from preferential access to

**Table 2. Estimation Results**

Variables	Random effects (PCSE)	Random effects (GLS)
GDP Germany	-0.764 (0.397)	-1.191*** (0.328)
GDP per capita Germany	-3.042** (0.981)	-3.188** (1.082)
GDP exporting country	0.809*** (0.152)	0.867*** (0.152)
GDP per capita exporting country	5.275*** (0.786)	5.711*** (0.818)
Distance	-0.0008*** (0.00004)	-0.0008*** (0.0001)
Immigrants	0.725* (0.252)	1.530*** (0.366)
EU membership	3.005*** (0.279)	3.240*** (0.631)
Mediterranean Partnership	5.060*** (0.872)	6.040*** (0.902)
German tourism	2.831*** (0.269)	2.294*** (0.349)
Direct marketing	3.845*** (0.142)	3.992*** (0.128)
Labelling	-3.067*** (0.402)	-3.710*** (0.380)
Real exchange rate	-0.0527*** (0.014)	-0.025 (0.019)
Constant	-10.845 (5.598)	-11.014* (5.145)
R <sup>2</sup>	0.80	-
Log Likelihood	-	-154.77

Notes: Values in parenthesis are the standard errors of the regression coefficients, \*\*\* (\*\*, \*) statistically significant at the 99.9% (99%, 95%) level. The panel-corrected standard errors are correct for heteroskedastic and contemporaneous correlated disturbances.

Source: BECK and KATZ (1995)

the EU market. However, the fact that olive oil exports from non-Mediterranean countries to the German market increased by 17.3 and 58.8% in 1995-2000 and 2000-2007 (see table 1), respectively, suggests that the importance of trade diversion may be limited.

The estimated coefficients of direct marketing and EU membership further suggest that the possibility of German super market chains to import directly from exporters and being a EU member state creates trade by about 4 and 3%, respectively. Labelling is the only dummy variable with a negative coefficient, implying that bulk has more potential to enter the German market than packaged and labelled olive oil, fact that should be attributed to the structure of the exporters supply chain of olive oil, where most of the exporting countries supply bulk olive oil (FLATAU et al., 2007). Moreover, immigration to Germany as well as German tourism has a positive effect on olive oil trade. This is certainly interesting for the Mediterranean Partner Countries, since it implies on the one side that attracting German tourists may be an opportunity to boost their exports to the German market and on the other side that immigrants tend to consume products of their country of origin thus benefiting exporters of their home countries. Finally, the parameter estimates of geographical distance and real exchange rate are negative but have only minor impacts on Germany's olive oil imports.

## 5. Summary and Outlook

As trade relationships among the EU and the non-EU Mediterranean countries are expected to deepen with the Barcelona Agreement and the recently discussed conclusion of a Mediterranean Union, the interest of the Mediterranean countries to extend their trade is expected to increase.

This study empirically investigates the impacts of these preference agreements on Euromediterranean trade integration using the example of olive oil exports to Germany as it is a traditional Mediterranean commodity and Germany is the largest market in the EU. Additionally, other factors that might boost olive oil producing countries' exports to Germany are considered. A gravity model has been employed so as to stress those factors that explain the German imports of olive oil, which were identified in a preceding analysis of the German olive oil supply chain.

The results suggest that being a Mediterranean Partner Country of the EU appears to have a high impact on trade flows to Germany, fact alone that is promising for further trade creation with the deepening of the Barcelona Agreement. In fact, preferential agreements seem to be the most important determinant of olive oil exports from non-EU Mediterranean countries to Germany. However, it remains to be seen whether this result can be transferred to other products and EU member states. Moreover, further research is needed to determine whether trade creation rather than trade diversion is the driving force behind this effect. In this context, extending the analysis to the time period prior and after the establishment of the Barcelona Agreement in 1995 would go beyond the identification of integration effects and could provide interesting insights to the question whether the Barcelona Agreement changed the structure of bilateral trade flows between the EU Mediterranean member states vis-à-vis MPCs.

Besides preference agreements, the analysis identifies further factors determining olive oil trade. A positive relationship of the exporters' economic size to the level of German imports suggests that larger economies among the MPCs have more potential to export. The analysis also suggests that olive oil is not seen as a luxury good by German consumers. Moreover, olive oil imports to Germany are found to be positively related to direct marketing and to tourism meaning that the creation of direct marketing channels with German super market chains as well as attracting German tourists seem to be important factors that could boost exports to Germany. Supposing that both the German and the exporters' olive oil supply chain remains as such, exporting packaged and labelled olive oil seems to enter the German market with more difficulties than bulk.

That is to say, there is potential for non-EU Mediterranean producers to boost olive oil exports. First, olive oil may enter the German market by exploring direct marketing channels. Second, by advertising the special characteristics of olive oil and the particular regional differences in the quality, consumers could start considering olive oil as a luxury good asking for labelled olive oil giving producers the opportunity to benefit from selling olive oil in a higher quality and price segment in Germany as long as they improve their own logistics and export packaged olive oil.

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Contact author:

**DR. AIKATERINI KAVALLARI**

Institute for Agricultural Policy and Market Research

Justus Liebig University of Giessen

Senckenbergstr. 3, 35390 Giessen

e-mail: aikaterini.kavallari@agr.uni-giessen.de