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Impact of transport cost on the ‘attractiveness’ of export markets for Greek agricultural products

Theodore Tsekeris and Georgia Skintzi
Centre of Planning and Economic Research (KEPE)

Motivation and Objectives

- PROMOTION OF EXPORT-LED GROWTH AND OUTWARD ORIENTATION OF INDUSTRIES/FIRMS AND TACKLE OF MULTIPLE GEOPOLITICAL AND MACROECONOMIC-FISCAL RISKS, TRADE WARS, AND SUPPLY CHAIN DISRUPTIONS.

- ADVANCEMENT OF AN EXISTING TOOL FROM INTERNATIONAL MARKETING RESEARCH TO HELP AN EXPORTING COUNTRY TO IDENTIFY AND CLASSIFY THE MOST ‘ATTRACTIVE’ MARKETS WITH THE HIGHEST REALISTIC EXPORT OPPORTUNITIES (REO).
    - Utilize criteria recognized by the international literature.
    - Include more realistic transport cost considerations.

- SPECIFICATION AND IMPLEMENTATION OF THE DECISION SUPPORT MODELING (DSM) TOOL INTO THE EUROPEAN EXPORT MARKET OF THE GREEK AGRICULTURAL PRODUCTS.

Description of Methodology

THE ANALYTICAL FRAMEWORK RELIES ON FOUR CONSECUTIVE FILTERS, IN WHICH A SET OF CRITERIA IS APPLIED TO SEQUENTIALLY REJECT MARKETS (DESTINATION/PRODUCT COMBINATIONS) THAT DO NOT MEET THEM AND PRIORITIZE THE MOST ‘ATTRACTIVE’ MARKETS.

- **Filter 1**: Political and commercial risks - Size and growth of the economy.
- **Filter 2**: Size and market dynamics.
- **Filter 3**: Obstacles and difficulties entering the market, incl. transport.
- **Filter 4**: Classification of “attractive” markets.

Filter 1a: Political and commercial risks

- Countries are assessed based on their political risk on a scale between 1 - 7 (1 low political risk, 7 high political risk).

- Countries are assessed based on their commercial/trade risk with "A", "B" or "C" (where "A" indicates low commercial risk and "C" indicates high commercial risk).

  - The scale 1-7 is converted to a scale of 1-10 for the two policy risk assessments (short-term and medium / long-term).

  - The trade risk scale is transformed to a scale of 1-10 (the "A" corresponds to 3.33, "B" to 6.67 and "C" to 10).

  - The 80th percentile is used as a critical value to exclude the less "attractive" countries.

Filter 1b: Size and growth of the economy

- The remaining countries are assessed based on four macroeconomic indicators:
  - GDP
  - per capita GDP (pcGDP)
  - rate of change in GDP
  - average rate of change in GDP over a three-year horizon (2018-2020)

- In this way, "large" economies (in terms of GDP and pcGDP), as well as the countries that fast economic growth (in terms of rates of change in GDP and pcGDP) are identified.

- The 20th percentile is used as a critical value in terms of the GDP and the pcGDP.

Filter 2: Size and market dynamics

THE MOST "ATTRACTIVE“ MARKETS ARE SELECTED BASED ON THEIR DYNAMICS AND SIZE, USING THREE CRITERIA:

(a) the rate of change of each country’s imports for each product imported in the recent *short-term period* (2019-2020).

(b) the rate of change of imports of each country for each product imported *in the long run* (2016-2020).

(c) the relative market size $RM_{ij}=M_{ij}/M_{wj}$, where M_{ij} is the country’s imports of product j and M_{wj} is the world imports of product j. +
→ A market is considered large if it holds that $RM_{ij} \geq 0.02 M_{wj}$.

- In order a market to pass to the next filter, it should present both short-term and long-term rate of change of its imports for this product higher than the corresponding global average rate of change.

Filter 3a: Degree of market concentration

It is based on the Herfindahl index $HI = \sum_{x=1}^{N} s_{xij}^2$, where s_{xij} is the share of country x in that market (country of import / product) *ij* and *N* is the number of countries exporting in the specific market. A market is considered to meet the criterion of market concentration if:

I. HI≤0.4 and the market is large but does not show short-term and long-term growth,

II. HI≤0.5 and the market is not large but shows short-term and long-term growth,

III. HI≤0.5 and the market is large and shows either short-term or long-term growth,

IV. HI≤0.6 and the market is large and shows both short-term and long-term growth.

Filter 3b: Transportation cost

Several indices can be used to express the international transport cost from the capital city of the exporting country to the capital cities of the importing countries:

A. Physical or network distance

B. (Road, maritime or overall) international transport cost as the difference between import cost (CIF) and export cost (FOB)

C. International transport cost per product unit (tonne)

D. International transport cost per distance (1000 km)

E. International transport cost per product unit per distance

- The 80th percentile can be simply used as the critical value for rejecting those markets that have high transport costs, or different percentiles (1/3, 2/3).

Filter 4: Classification of "attractive" markets

THE RELATIVE MARKET SHARE IS CALCULATED FOR THE REMAINING EXPORT MARKETS, AND THE MARKETS ARE CLASSIFIED ACCORDING TO THEIR SIZE AND GROWTH (FILTER 2) AND THE RELATIVE MARKET SHARE.

The relevant market share of country *x* is calculated by the formula:

$$RMS_{x,i,j} = \frac{X_{x,i,j}}{X_{W,i,j}}$$

where $X_{x,i,j}$ are the exports of the country *x* for product *j* in import country *i*, and $X_{W,i,j}$ are the world exports for product *j* in country *i*. Then, markets are classified as:

a. $RMS_{x,i,j} \leq 0.03$: The relative share of country *x* is small.

b. $0.03 < RMS_{x,i,j} < 0.15$: The relative share of country *x* is small to medium.

c. $0.15 < RMS_{x,i,j} < 0.3$: The relative share of country *x* is medium to large.

d. $RMS_{x,i,j} \geq 0.3$: The relative share of country *x* is large.

Types and sources of data

Database	Variable/index	Data source	Time span (years)
CREDENDO	• Political risk • Trade risk	https://credendo.com/en/country-risk/world	Until now (2022)
World Bank	• GDP • Per capita GDP • GDP growth rate • Per capita GDP growth rate	https://data.worldbank.org/	2000-2020
United Nations COMTRADE	• Import value • Export value	https://comtrade.un.org/	2000-2021
International Trade Center (ITC / Trade Map)	• Destination market concentration index • Import value (as in COMTRADE) • Export value (as in COMTRADE)	https://www.trademap.org	2016-2020
UNCTAD	• International transport cost (per commodity per unit, per distance, and per unit per distance, for specific and for all transport modes)	https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx	2016

→ Data/variables from other international databases could also be (alternatively or supplementary) used, for instance, to represent components of transport cost for specific modes, such as the Maritime Transport Costs from the OECD database.

Demonstration of qualitative results

	Relative market share			
	Small	**Small/Medium**	**Medium/Large**	**Large**
Large market size	LDD	LDC	LDB	LDA
Short-term & long-term growth	SAD	SAC	SAB	SAA
Large market size & short-term growth	LCD	LCC	LCB	LCA
Large market size & long-term growth	LBD	LBC	LBB	LBA
Large market size & short-term & long-term growth	LAD	LAC	LAB	LAA

(a) The first ranking is the market size (L: large market size, S: small market size).

(b) The second ranking is the market growth (A: long-term and short-term growth, B: long-term growth, C: short-term growth, D: neither long-term nor short-term growth).

(c) The third ranking is the relative market share (A: large relative market share, B: medium to large relative market share, C: small to medium relative market share, D: small relative market share).

Process of calculation of numerical results

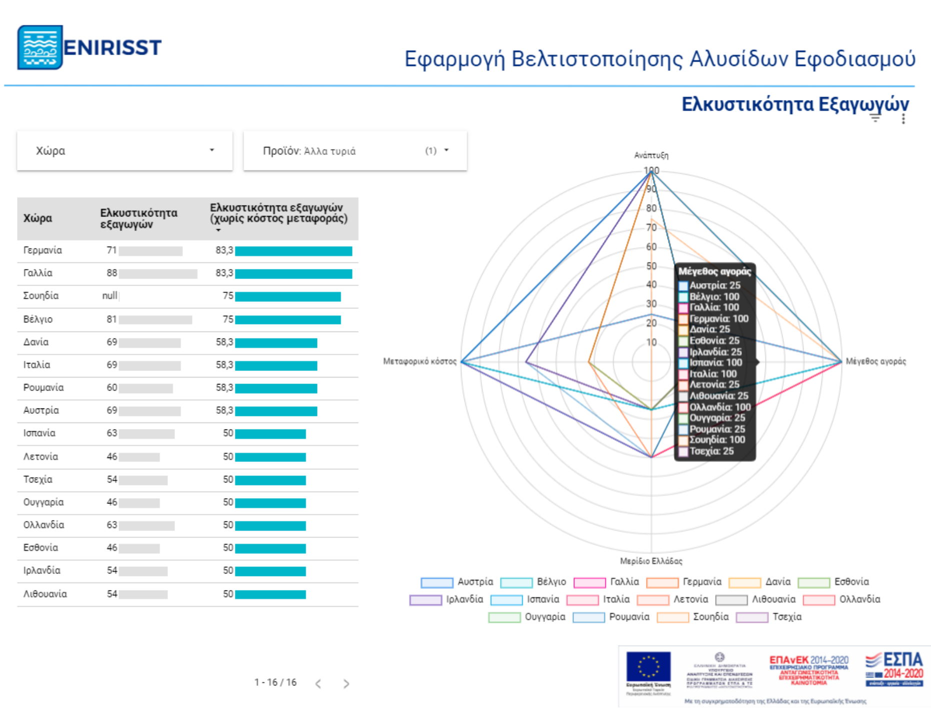
Qualitative Index			Numerical Index			Overall Index
Market size	Market growth	Relative share of Greece	Market size	Market growth	Relative share of Greece	Average
L	A	A	100	100	100	100
L	A	B	100	100	75	92
L	A	C	100	100	50	83
L	A	D	100	100	25	75
L	B	A	100	75	100	92
L	B	B	100	75	75	83
L	B	C	100	75	50	75
L	B	D	100	75	25	67
L	C	A	100	50	100	83
L	C	B	100	50	75	75
L	C	C	100	50	50	67
L	C	D	100	50	25	58
L	D	A	100	25	100	75
L	D	B	100	25	75	67
L	D	C	100	25	50	58
L	D	D	100	25	25	50
S	A	A	0	100	100	67
S	A	B	0	100	75	58
S	A	C	0	100	50	50
S	A	D	0	100	25	42

(a) The attractiveness index can be converted to a numerical index by corresponding L to 100, S to 0, A to 100, B to 75, C to 50 and D to 25.

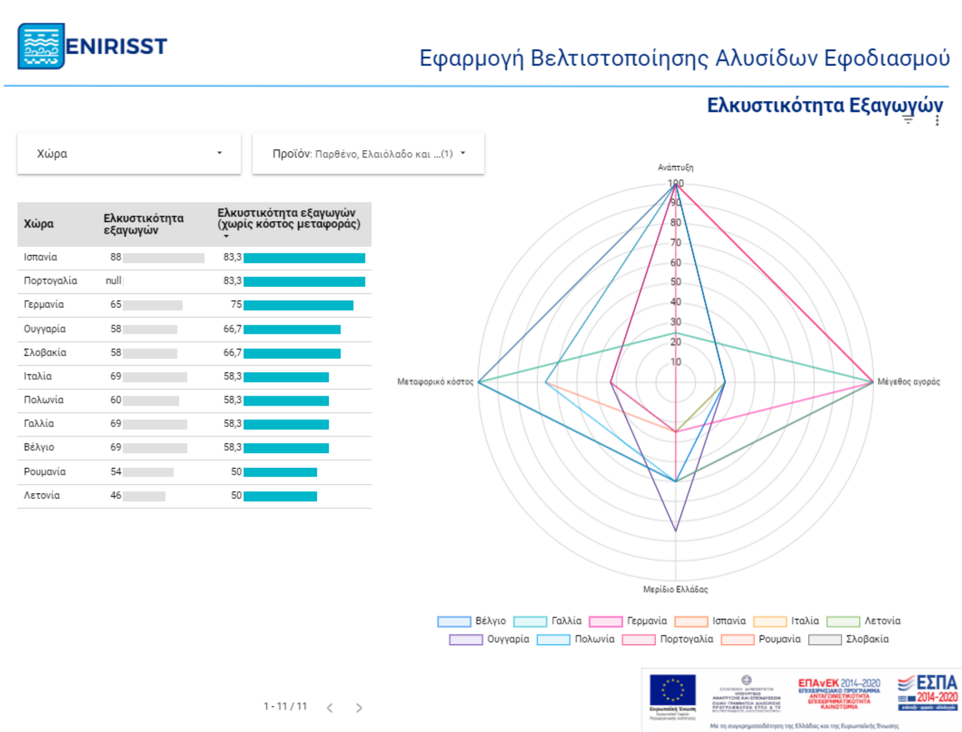
(b) The average of the scoring of the three variables is the numerical value of the index. All three variables are weighted as equal.

(c) The numerical and qualitative indicators can also be used in combination.

Demonstration of numerical results



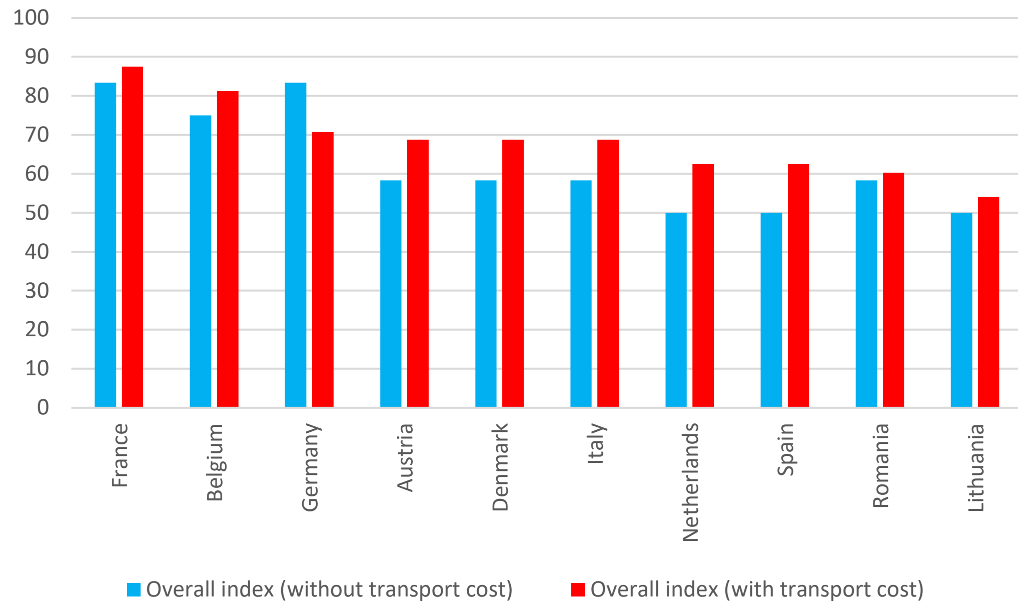
Results for the “attractiveness” index of the Greek cheese products to the EU markets without and with transport cost

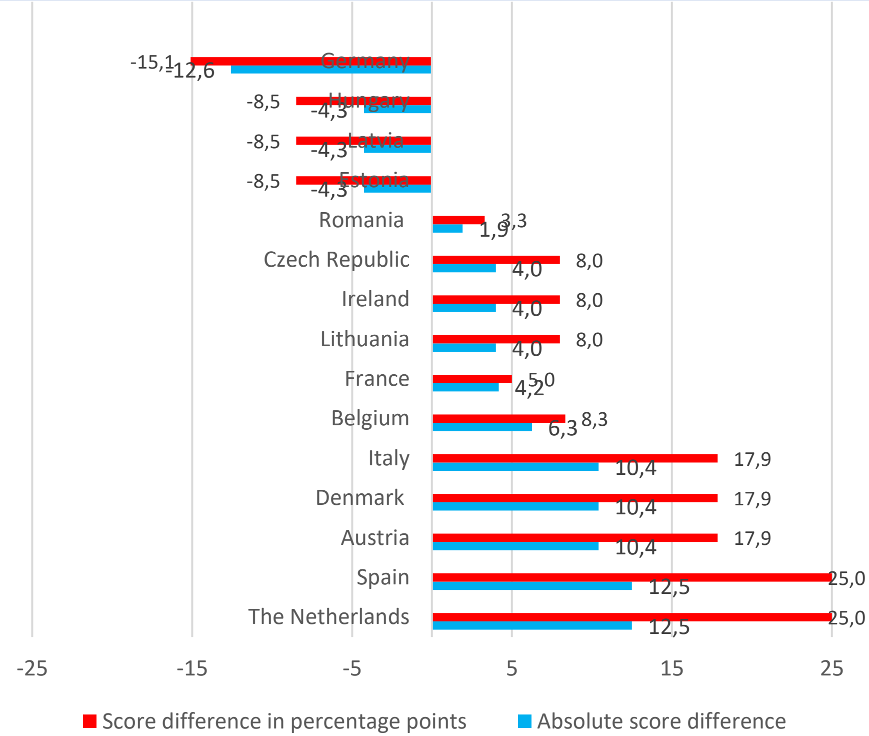


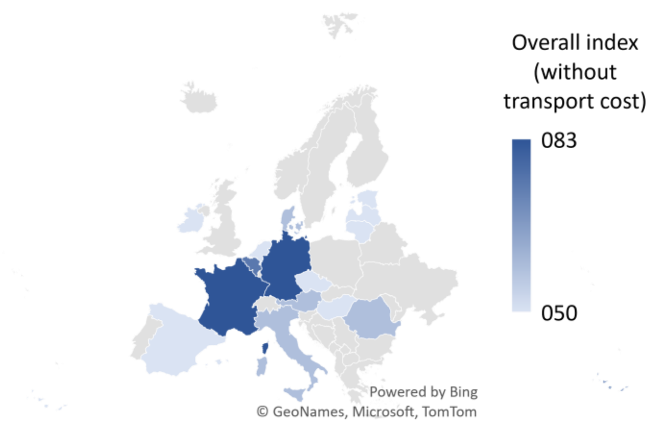
Results for the “attractiveness” index of the Greek virgin olive oil products to the EU markets without and with transport cost

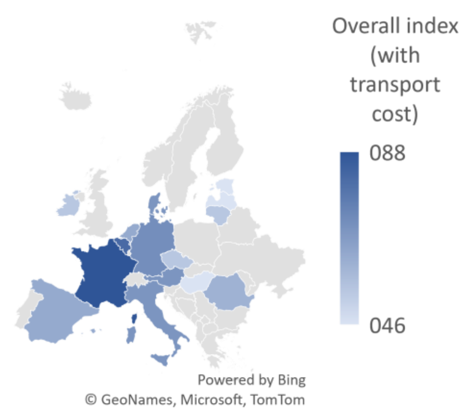
- These results are illustrated through selected options in the application service “Supply Chain Optimization” of the “Inland and Intermodal Freight Transport” Platform of the Intelligent Research Infrastructure for Shipping, Supply Chain, Transport and Logistics (EN.I.R.I.S.S.T.) (www.enirisst.gr)

Empirical results – The Greek Cheese market in the EU





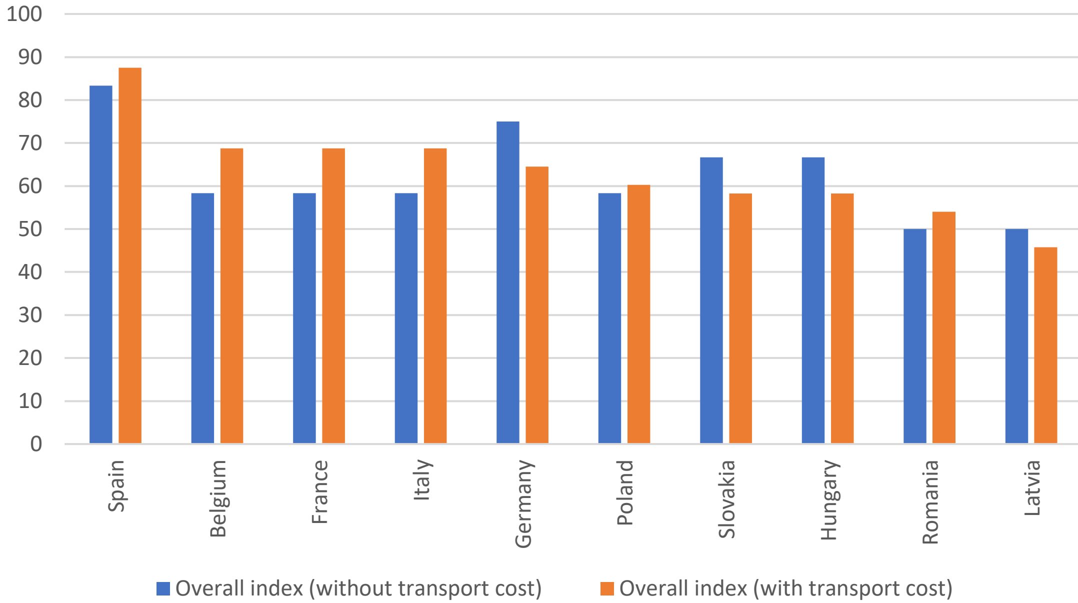


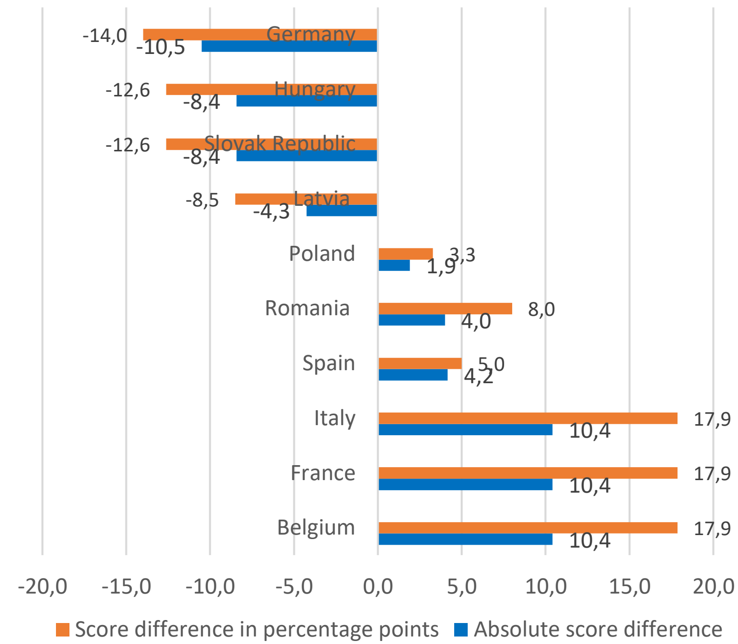


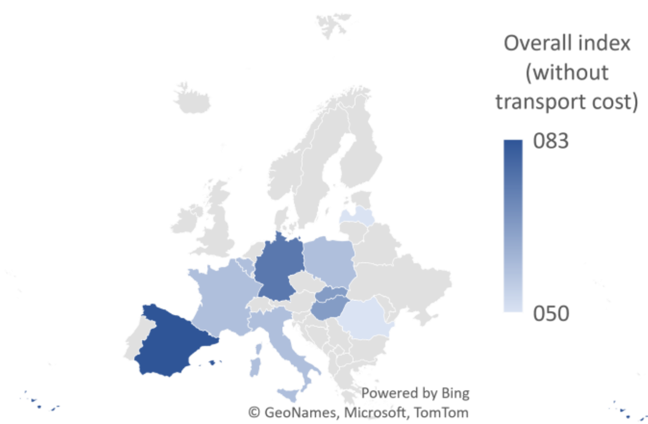
(a) The index of transport cost per product unit per 1000-km distance is included in the calculation of the overall "attractiveness" index and is compared to the corresponding index without transport cost.

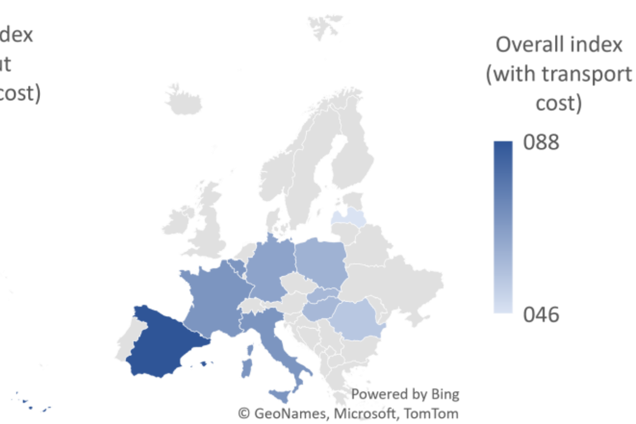
(b) The overall index value and the classification of the most "attractive" market change with the inclusion of transport cost.

Empirical results – The Greek Virgin Olive Oil market in the EU









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Conclusions

- The considerable and heterogenous impact of transport cost on the “attractiveness” index and the classification of the most “attractive” markets indicate the need to account for the adequate supply and efficiency of transport and logistics services in the (agricultural) supply chains.

- The Greek companies (export firms and international carriers/freight forward enterprises) could exploit such a DSM in planning their transport operations and export marketing strategies with specialized customer services.

- Government agencies could also harness the findings of the DSM to identify formulate an effective development policy and fast and reliable transport corridors to promote Greek (agricultural) exports.

Further research

- Increase the sample size and compare the results for different types of agricultural (and industrial) products.
- Increase the sample size and compare the results for different geographical areas around the world.
- Use other types of transport cost indices and include more qualitative attributes of transport cost (e.g., level-of service variables and environmental cost attributes).
- Compare the results for different types and combination of modes per product category.

Thank you for your attention!

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Theodore Tsekeris

E-mail: tsek@kepe.gr