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Realistic export opportunities for the Greek Economy

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Abstract

We identify realistic export opportunities for the Greek Economy using a Decision Support Model (DSM), based on annual export and import data at the four-digit SITC level. We find that substantial realistic opportunities exist for Greek firms to export to Euro Area and Balkan countries. The number of realistic export opportunities identified in the United States is the largest of any country, highlighting the importance of the American market for the Greek economy. We find that the sectors with the most realistic export opportunities for Greece are manufactured goods classified chiefly by materials (SITC 6) and food and live animals chiefly for food (SITC 0). Our empirical results provide weak positive evidence that the machinery and transport equipment (SITC 7) sector could represent a dynamic export sector, as it comprises significant realistic export opportunities.

1.   Introduction

After a long period of economic depression, the Greek economy is seeking driving forces that will lead to robust economic growth. The export-led growth hypothesis is verified by many studies (Kunst and Marin, 1989; Konya, 2006; Konstantakopoulou, 2016; 2017; Shafiullah, et al., 2017).

Over time, the Greek trade balance is negative with imports far exceeding exports, accounting for a trade deficit €19.15 billion on average in the 2013-17 period. The government aims to reduce this large and persistent deficit by increasing exports. This article identifies a limited set of export opportunities for the Greek economy that should be strengthened and promoted to improve the trade balance. The Greek government and Greek firms are looking for those export markets that will bolster their exports. Our study, whose purpose is to identify realistic export markets for the Greek economy, contributes to this goal. Market opportunities for increasing exports are identified using a filtering statistical method.

The results of the method used could serve as a guide for identifying which export markets could achieve the fastest export growth and planning a more effective export policy. Specifically, the government could design an export promotion policy to successfully allocate the limited resources for export activities and export promotion programs to a defined number of realistic export market opportunities.

In this study, we apply the DSM approach, which has been successfully employed in similar studies with fairly accurate empirical results (Cuyvers et al., 1995; Cuyvers 2004; Pearson et al., 2010; Cuyvers et al., 2017; Kumar, et al., 1993; Sakarya, et al., 2007; Ozturk, et al., 2015). As DSM can obtain unbiased results using measurable macroeconomic variables, it is a tool that helps policymakers design export promotion activities while taking into account the limited list of options resulting from its implementation results.

The rest of this paper is organized as follows: Section 2 presents the literature review. Section 3 describes the data and methodology. Section 4 develops the empirical results. Section 5 concludes.

2.   Literature Review

Over the past three decades, several studies have identified export opportunities. These studies are divided into country-level (Cuyvers et al., 1995; Cuyvers 2004; Pearson et al., 2010; Cuyvers et al., 2017) and firm-level (Ozturk et al., 2015; Papadopoulos and Martin 2011; Sheng and Mullen 2011). Country-level and firm-level studies used methods with similar tools to identify export opportunities. Papadopoulos and Denis (1988), and Steenkamp et al. (2012) classified the methods of identifying export opportunities, as qualitative or quantitative. The qualitative methods have been considered as professional bias by several works (Papadopoulos and Denis, 1988). The quantitative methods are data-based and have been applied in many countries worldwide. The main quantitative method is that of market estimation (Kumar, et al., 1993; Sakarya, et al., 2007; Ozturk, et al., 2015). Market estimation uses a filtering procedure that includes several criteria to evaluate potential export opportunities.

The DSM approach, classified as a market estimation method, is an extensively applied filtering procedure. Cuyvers et al. (1995) identified potential export opportunities using DSM for Belgium, and Cuyvers (2004) for Thailand. Pearson et al. (2010) detected potential export opportunities for South African firms versus Chine, Brazil, and India using a DSM. Steenkamp et al. (2012) used a DSM for South Africa, in order to provide empirical evidence to the Department of Trade and Industry for planning export promotion activities. Recently, Cuyvers et al. (2017) found Thailand's realistic export opportunities in the ASEAN+3

countries (Association of Southeast Asian Nations; China, Japan, and South Korea) using a DSM.

The DSM is a sequential filtering procedure for identifying realistic export opportunities, which leads to a limited list or "choice set" of excellent export opportunities (Cuyvers et al., 1995). Using four filters, it progressively evaluates the attractiveness and accessibility of potential export opportunities. The main idea of the DSM is that by applying filters, less attractive export opportunities are eliminated. Its main advantage is that it takes into account all product-country combinations to select realistic export opportunities.

3. Data and Empirical Methodology

Data

Annual data on export and import at the one-digit SITC (Standard International Trade Classification, Rev.2) level is supplied by the Comtrade (United Nations Commodity Trade Statistics Database). The four-digit SITC classification level contains 762 products (or sectors). Our initial sample includes 173 countries, i.e. 131,826 product-country combinations. We also use data of GDP and real GDP at constant 2010 prices are derived from the World Development Indicators of the World Bank. The annual data has a time span of 2013–2017. The data on Risk indicators are from the ONDD (Office National du Ducroire, CREDENDO).

Methodology

We apply a DSM with four sequential filters. The DSM method is based on several criteria, which must be fulfilled in each filter for export opportunities to continue to exist. These criteria evaluate the economic environment, import market size and import growth rates of markets, market concentration and accessibility, and export specialization.

Filter 1

In the first Filter, candidate export markets are assessed based on their macroeconomic and risk features. The idea behind this principle is to quickly exclude markets with very low GDP or GDP per capita, and markets with very high political and commercial risk, in order to focus on a more limited set of *preliminary export opportunities*. This filter includes two criteria.

Macroeconomic features criterion. The first criterion of filter 1, we identify countries with large size of their economies (GDP and GDP per capita) over the period from 2014 to 2017. We calculate the critical value (CV) of GDP and GDP per capita for each of the three years using to the following equation: $CV = \overline{x_t} - \alpha\sigma_{x,t}$ where $\overline{x_t}$ is the average of GDP (GDP per capita), $\sigma_{x,t}$ is the standard deviation of GDP (GDP per capita), and a is a parameter. Following the methodology of Pearson el al. 2010, we calculated the value of parameter alpha using a simulation process where the a value is varied between 0 and 1 by increments of 0.001. The selection of the alpha parameter is obtained through visual inspection of the graphical representation of the function of critical value and simulated alpha values for the years 2015, 2016, and 2017. In the next step, we compute the critical values for the respective years. Thus, countries are accepted if: $X_j \geq CV$, where X_j is the value of GDP (GDP per capita) of country j. In particular, we eliminated the countries whose GDP or GDP per capita is less than the respective critical value, for at least two consecutive years over the period of 2014-2017.

Political and commercial risk criterion. We evaluate the risk of the candidates export markets using the credit rating methodology of ONDD. The ONDD measures political and commercial risk. The political risk index ranges from 0 to 7. This index is rescaled from 1 to 10. A lower value equates a low political risk. The Commercial risk index is measured as "A", "B" or "C", where a "A" indicated low commercial risk. We rescaled this index from 1 to 10. Thus, a "C" rating indicates a score of 10. We calculate an overall index which is a weighting of the two risk indicators. This overall risk index measures the risk of each country.

Finally, the 80th percentile of this country risk score is used as a critical value to reject less interesting countries from this filter. We reject countries that have risk rating higher to the cut-off point.

Filter 2

The second filter assesses preliminary export opportunities using import market size, and import growth rates. The unit of analysis is the product-country combination. We identify the **_possible export opportunities_** using three criteria: a) Short-run import growth rates, b) long-run import growth rates, and c) Import market size. We calculate the short and long run growth rate of imports and the size of imports for all preliminary product-country combinations.

Short-run and long-run import growth rates criteria. The short-run import growth rate is calculated for the two most recent years (2016-17), and the long-run import growth rate for at least five continuous years (2013-17). We calculated the critical values for all products at 4-digit SITC, taking into account the Greek economy's export specialization. Konstantakopoulou and Tsionas (2019) have shown that comparative advantages affect a country's export specialization. We firstly calculate the RCA index for the 2013-17 period. The RCA index for the Greek Economy is calculated with respect to the 85 countries. The RCA index is as follows:

$$RCA_j^{GRC} = \frac{X_j^{GRC}/\sum_j X_j^{GRC}}{\sum_i X_j^i/\sum_i \sum_j X_j^i}, \text{ for } i = 1, 2, \dots 85 \ , \ \ j = 1, 2, \dots 762$$

RCA_j^{GRC} is the revealed CA of Greek Economy in product j, X_j^{GRC} is Greece's export value of product j, $\sum_j X_j^{GRC}$ is the total exports of Greece, $\sum_i X_j^i$ is the total exports of the 85 countries in product j, $\sum_i \sum_j X_j^i$ is the total exports of the 85 countries. If $RCA_k^i > 1$ involves that country i has a comparative advantage for product j or is specialized in the production of product j. While, if $RCA_k^i < 1$ involves that country i has not specialized in product j. We calculate the growth rate of imports $g_{i,j}$ of product j for country i for all countries $i = 1, 2, \dots 85$ and product $j = 1, 2, \dots 762$. To determine whether a country i for product j shows a potential in terms of the growth rate of imports we apply the following criterion: $g_{i,j} \geq G_j$. The critical value G_j is computed in Equations (1) and (2) as follows:

$$G_j = g_{w,j} s_j \quad \text{if } g_{w,j} \geq 0 \tag{1}$$

$$G_j = \frac{g_{w,j}}{s_j} \quad \text{if } g_{w,j} < 0 \tag{2}$$

where $g_{w,j}$ denotes the growth rates of world imports for the product j, and s_j is a scaling factor that defines the export specialization of Greece for product j and it is given in Equation (3):

$$s_j = 0.8 + \frac{1}{(RCA_j + 0.85)e^{(RCA_j - 0.01)}} \tag{3}$$

The critical value is calculated for both short and long run imports growth rates of product j for country i.

Import market size criterion. The import market size criterion focuses on the import market size or import demand of country i for product j. The import market size of country i for product j was considered to be sufficiently large if: $M_{i,j} \geq C_j$. The critical value (C_j) of the import market size which a market may be considered as a possible export opportunity is calculated as follows:

$$C_j = 0.02 M_{w,j} \qquad \text{if} \qquad RCA_j > 1 \tag{4}$$

$$C_j = \left[\frac{3 - RCA_j}{100}\right] M_{w,j} \qquad \text{if} \qquad RCA_j \leq 1 \tag{5}$$

where $M_{i,j}$ is the import market size of country i for product j, and $M_{w,j}$ is the world imports for the product j. Therefore, if a product-country combination meets the condition of the 3rd criterion, it is a possible export opportunity. A product-country combination is accepted as a possible export opportunity if the short- or long-run import growth rate is greater than their critical value and, if this is not true, then the import market size should be greater than their critical value. For the import markets size, short- and long-run growth in import demand, "1" is assigned in the relevant column of Table I if the selection criteria described above are met and "0" if not. This is used to classify each product-country combination into one of eight categories in Table I. The product-country combinations that belong to categories 4, 5, 6 or 7 are accepted.

Table I: Categorization of product-country combinations in filter 2

Category	Short-term imports growth	Long-term imports growth	Relative import market size
0	0	0	0
1	1	0	0
2	0	1	0
3	0	0	1
4	1	1	0
5	1	0	1
6	0	1	1
7	1	1	1

Source: Cuyvers et al., 1995, and 2004.

Filter 3

In this filter, we identify ***probable export opportunities*** using two criteria: market concentration and market accessibility. Before product-country combinations become realistic, we need to assess the ability of the Greek economy to succeed in importing markets.

Market accessibility Criterion. This criterion is related to trade barriers to entry or distance. The "distance to market" variable is derived by the *dist_cepii* variables of the CEPII database. This variable calculates the geographic distance between Athens and the capital cities of the destination countries, under the premise that capital cities constitute economic centers. This criterion was estimated in a proportionate way to the filter 1. A critical value

(CV) is calculated as follows: $CV = \overline{x_t} - \alpha\sigma_{x,t}$ where $\overline{x_t}$ the average value and $\sigma_{x,t}$ the standard deviation of distance between the capital city Athens, and the capital cities of each of the other countries.

Criterion: Market concentration. We use the market concentration criterion to measure the extent to which importing markets are dominated by one or more competitors. Low market concentration encourages entry of an exporting country. We degree of market concentration is calculated by the Herfindahl-Hirschmann Index (HH) as follow:

$$HHI_{i,j} = \sum_k \left(\frac{X_{k,i,j}}{M_{i,j}}\right)^2$$ where $HHI_{i,j}$ is the HH index of product j in country i from

country k, $X_{k,i,j}$ is country k's export of product j to country i, and $M_{i,j}$ is country i's total imports of product j.

If the index equals the unit, then the market structure is monopolistic. It is easy to understand that in this case would be more difficult for the Greek firms to entry in such a market. The critical values for market concentration depend on the category to which the product-country combination was placed in filter 2. If a product-country combination is placed in categories 4, 5, and 5, then we allow the concentration index to get values up to 40 per cent ($HHI \leq 0.40$) If a market classify to category 7, then the HH index can take values up to 50 per cent ($HHI \leq 0.50$), and then it can be accepted (Cuyvers et al., 2017).

Filter 4

Export specialization criterion. In this Filter, we use the criterion of export specialization to identify *realistic export opportunities*. The probable export opportunities are filtered taking into account the Greek economy's export specialization. A product-country combination can be considered as a realistic export opportunity if the Greek economy is specialized in that product. For this purpose, we set the cut-points at RCA> 0.4 (Cuyvers et al., 2017). The idea is that if Greece is export-specialized in a product (RCA > 0.4), one may permit the selection of interesting markets to be more lax than if it is not (RCA < 0.4).[1]

The export specialization criterion is the last link of "the DSM procedure chain"; all links lead and determine the limited set of realistic export opportunities for the Greek economy.

4. Empirical Results

In the first filter, we identify *preliminary export opportunities*. The initial sample is reduced by 58 countries using the first criterion of Filter 1. Most eliminated countries come from Sub-Saharan Africa, followed by East Asia and Pacific, and Latin America & Caribbean. We find that 30 countries are excluded for the next filter using the second criterion of Filter 1. The excluded countries are mainly from sub-Saharan Africa, the Middle East and North Africa, and East Asia and Pacific. Therefore, we should continue for the 2nd Filter with 85 counties or *64,770 preliminary export opportunities*.

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[1] The critical value (cv_{rca}) is calculated as follows (Pearson et al, 2010): $cv_{rca} = \overline{x_t} - \alpha\sigma_{rca,t}$, where $\overline{x_t}$ is the average value and $\sigma_{rca,t}$ the standard deviation of the RCA for year t. The value of α is chosen by means of a simulation process where α takes values between 0 and 1, by increments of 0.001.

In the second filter, we identify *possible export opportunities*. Our results indicate that 19,977 possible export opportunities are accepted, while 44,793 preliminary export opportunities are eliminated. We identify 4,746 possible product-country combinations in *Manufactured goods classified chiefly by materials* (SITC 6) and 4,334 in *Machinery and transport equipment* (SITC 7), which representing 23.75% and 21.69% of total possible export opportunities, respectively. In particular, the most possible product-country combinations at the one-digit SITC level are detected in *Miscellaneous manufactured articles* (SITC 8): 2,795 (13.99%); *Food and live animals chiefly for food* (SITC 0): 2,788 (13.96%); *Chemicals and* related *products, nes* (SITC 5): 2,183 (10.93%); *Crude materials, inedible, except fuel*s (SITC 2): 2,029 (10.16%); *Animal and vegetable oils, fats and waxes* (SITC 4): 513 (2.57%); *Mineral fuels, lubricants and related materials* (SITC 3): 257 (1.66%); *Beverages and tobacco* (SITC 1): 332 (1.29%).

The top five possible export opportunities at the four-digit SITC level for Greece are as follows: *Olive oil* (SITC 4235) in 54 countries; *Other citrus fruits, fresh or dried* (SITC 0572) in 52 countries; *Fish, fresh or chilled, excluding fillet* (SITC 0341) and *Fruit, fresh or dried, nes* (SITC 0579) in 50 countries; *Spices, except pepper and pimento* (SITC 0752) in 49 countries.

The countries with the largest number of possible export opportunities are the United States, China, Germany, France and the Netherlands.

In the third filter, we identify *probable export opportunities*. Using the Market accessibility criterion, we should exclude the following countries: Argentina, Barbados, Botswana, Dominican Republic, Chile, Costa Rica, El Salvador, Guatemala, Indonesia, Paraguay, Peru, Philippines, Sri Lanka, South Africa, Tanzania, and Uruguay.

Using the market concentration criterion, we find that several countries have high market concentrations. Out of the possible 3,824 product-country combinations eliminated, the countries with the highest market concentrations are Vietnam, the United Arab Emirates, Albania, Mexico, Azerbaijan, Canada, Sri Lanka, Algeria, Hong-Kong, China, Jordan and Korea, Rep., etc.

With regard to sectors with high market concentration, which, as previously noted, are not considered probable export opportunities, we observe a particular monopolistic market structure is SITC 3. Thus, as excluded by the second filter, 48.86% of sectors are eliminated in SITC 3, followed by 35.78% in SITC 2, 30.02% in SITC 4, and 20.80% in SITC 0. Furthermore, 17.26% of sectors are eliminated in SITC 6, 16.96% in SITC 7, followed by 16.27% in SITC 1, 12.96% in SITC 5, and 12.16% in SITC 8.

The main four-digit SITC sectors that are eliminated due to high market concentrations are the following: *Raw silk (not thrown)* (SITC 2613), *Other coal, not agglomerated* (SITC 3222), *Housing or camping trailers* (SITC 7911), *Lignite, not agglomerated* (SITC 3223), *Nickel ores and concentrates; nickel mattes, etc* (SITC 2872), *Roasted iron pyrites* (SITC 2814), *Other rail locomotives; tenders* (SITC 7912); *Railway, tramway passenger coaches, etc, not mechanically propelled* (SITC 7914), *Mechanically propelled railway, tramway, trolleys, etc* (SITC 7913), *Asbestos* (SITC 2784).

In contrast, the main four-digit SITC sectors that exhibit low market concentrations are the following: *Sugar confectionery and preparations, non-chocolate* (SITC 0620); *Chocolate and other preparations containing cocoa, nes* (SITC 0730), *Food waste and prepared animal feed, nes* (SITC 0819); *Monocarboxylic acids and their derivatives* (SITC 5137); *Heterocyclic compound; nucleic acids* (SITC 5156); *Metallic oxides of zinc, iron, lead, chromium etc* (SITC 5224), *Pharmaceutical goods, other than medicaments* (SITC 5419); *Soaps, organic products and preparations for use as soap (SITC 5541)*; *Newsprint* (SITC 6411); *Paper and paperboard, in rolls or sheets, nes* (SITC 6415).

The top probable export opportunities at the four-digit SITC level for Greece are as follows: *S*ITC 0752 in 48 countries; *Pens, pencils and, fountain pens* (SITC 8952) in 47 countries; SITC 0579 in 46 countries; *Vegetables, frozen or in temporary preservative* (SITC 0546) in 45 countries; *Vegetable products roots and tubers, fresh, dried* (SITC 0548) in 45 countries; SITC 0572 in 44 countries; *Batteries and electric accumulators* (SITC 7781) in 44 countries.

In the fourth filter, we identify *realistic export opportunities*. Using the export specialization criterion, numerous probable export opportunities have been eliminated. In particular, we find that *realistic export opportunities are 5,919 product-country combinations.*

The product-country combinations at the one-digit SITC level that are identified as *realistic Greek export opportunities* are listed in Table II.

Table II: Distribution of realistic product-country combinations at one-digit SITC

SITC, Rev. 2	Greece	
	Number of four-digit SITC products	Percentage of the total REO
Food and live animals chiefly for food (SITC 0)	1,213	20.49%
Beverages *and tobacco* (SITC 1)	212	3.58%
Crude materials*, inedible, except fuel*s (SITC 2)	548	9.25%
Mineral fuels, lubricants and related materials (SITC 3)	31	0.52%
Animal and vegetable oils, fats and waxes (SITC 4)	161	2.72%
Chemicals and related products, nes (SITC 5)	646	10.91%
Manufactured goods classified chiefly by materials (SITC 6)	1,516	25.61%
Machinery and transport equipment (SITC 7)	799	13.49%
Miscellaneous manufactured articles (SITC 8)	747	12.62%
Commodities and transactions not classified elsewhere in the SITC (SITC 9)	46	0.78%
Total	**5,919**	**100**

It is obvious that realistic export opportunities of products come mainly from SITC 6 and SITC 0. These empirical results directly correlate with the export specialization of the Greek economy. ***Greece's specialization impedes a substantial increase in exports; nevertheless, this barrier by no means implies that the aforementioned sectors will cease to constitute fundamental pillars of Greek exports.*** Our empirical results also provide weak positive evidence that the SITC 7, could represent a dynamic export sector, as it comprises significant realistic export opportunities.

The most important ***realistic product-country combinations at the four-digit SITC level*** that result from the DSM for the Greek Economy are: *S*ITC 0752 in 44 countries; SITC 0579 in 43 countries; *Womens, girls, infants outerwear, textile, not knitted or crocheted blouses* (SITC 8435) in 41 countries; *Outerwear knitted or crocheted, not elastic nor rubberized jerseys, pullovers, slipovers, cardigans, etc* (SITC 8510) in 41 countries; SITC 0546, 0572, and 7781 in 40 countries; *Outerwear knitted or crocheted, not elastic nor rubberized of synthetic fibres not elastic nor rubberized* (SITC 8463) in 39 countries; *Miscellaneous articles of plastic* (SITC 8939) in 39 countries; *Crustaceans and molluscs, fresh, chilled, frozen, salted, etc* (SITC 0360) in 38 countries.

The ***geographical distribution of realistic export opportunities*** indicate that the Euro Area countries constitute 29.80% (1,764 product-country combinations) of Greece's realistic export opportunities. In North America and the Balkan countries, we identify 4.37% and 11.53% of REOs, respectively. The countries of the Middle East, and East and South Asia include 7.80% (462) and 9.54% (565) of Greece's realistic export opportunities.

From this filtering process, we identify 188 realistic export opportunities in the United States, 166 in Spain, 159 in China, 158 in France, 154 in Romania, 147 in the Netherlands, 145 in Italy, 142 in Iceland, 127 in Germany, 119 in India, 118 in Belgium, Croatia and Hungary, 117 in Czech Republic, 116 in Algeria and Korea, 113 in Thailand, 112 in United Kingdom, 110 in Bulgaria and etc.

5.   Concluding Remarks

In this paper, we identify realistic export markets for the Greek Economy. The market opportunities for increasing exports are identified using a DSM method.

We find that substantial realistic opportunities exist for Greek firms to export to Euro Area and Balkan countries. The number of realistic export opportunities identified in the United States is the largest of any country, highlighting the importance of the American market for the Greek economy. We find that the sectors with the most realistic export opportunities for Greece are *manufactured goods classified chiefly by materials* (SITC 6) and *food and live animals chiefly for food* (SITC 0). Our empirical results provide weak positive evidence that the *machinery and transport equipment* (SITC 7) sector could represent a dynamic export sector, as it comprises significant realistic export opportunities.

These empirical results directly correlate with the export specialization of the Greek economy. ***Greece's specialization impedes a substantial increase in exports;*** nevertheless, this barrier by no means implies that the aforementioned sectors will cease to constitute fundamental pillars of Greek exports.

Based on our findings, the Greek government could draw a more effective export policy, designing the export promotion policy and export promotion programs for a defined number of realistic export opportunities. In addition, by targeting realistic product-country combinations, the Greek economy will be able to achieve its export growth target and thus economic recovery after a period of deep economic recession.

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