

Limited Resources, Large Markets and the Crisis Aftermath: The Greek Exports to China

Dimitrios Karkanis¹ and Myrsini Fotopoulou²

¹LDSA, Department of Planning and Regional Development, University of Thessaly

²LDSA, Department of Planning and Regional Development, University of Thessaly

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Abstract: Greece's adoption of the common monetary policy occurs simultaneously with China's accession to the World Trade Organization in the early 2000s. Since then, bilateral trade relations have improved significantly in light of the economic crisis and China's economic penetration strategy in the European Union. This paper aims to assess export orientation patterns of EU countries, such as Greece, once these institutional changes have taken place, through applying the gravity model methodology. It also highlights structural diversification patterns, comparing the composition of Greek exports worldwide and towards China. The gravity model provides empirical evidence on the impact of Chinese import structure on bilateral trade. Limited internal resources and the relative absence of heavy industries in Greece imply strong dependency on exports to China carrying high import content.

Keywords: Greece, China, Gravity equation, Trade structure

JEL Classification: C23, F14

1. Introduction

Since establishing diplomatic relations in 1978 and until approximately a decade ago, there had been no substantial political or economic ties between China and Greece, two largely disparate countries. On the one hand, Greece constitutes a small, relatively closed and traditionally service-oriented economy, with a primary focus on domestic consumption and with external trade activities extending mainly to the Mediterranean and EU countries. On the other hand, a large and progressively open economy based largely on industrial production, China has become one of the main geopolitical and economic actors on a global scale, being the EU's second biggest trading partner behind the US. China's investing and trade expansion to Europe has put Greece on centre stage, owing to the latter's significant geographical and geopolitical advantage. Circumstances have been deemed particularly favourable most recently, following China's announcement of the Belt and Road initiative in 2013, amidst Greece's severe economic turmoil due to its sovereign debt crisis. Economic and diplomatic relations have since flourished, primarily through China's investment in the Piraeus port and the expansion of its commercial activities in Greece.

This collaboration has apparently proved beneficial for China and is meant to hold opportunities for the Greek economy as well, mostly through trade.

Export-oriented growth has indeed been integral to the Greek authorities' economic strategy after the crisis outbreak. Taking into consideration advancing bilateral relations, as well as China's newest economic policy for strengthening domestic consumption (Kang and Liao, 2016), this seems to be a great opportunity for Greece to work towards intensifying export activities to China. In this context, the objective of this article is to explore the evolution of Sino-Greek trade relations, particularly with respect to Greek exports of goods to China. To this end, the Greek merchandise export sector is primarily analysed in order to gain a better understanding of the corresponding export structure. A retrospective analysis of the Greek exports to China follows, with regard to the balance of trade flows between the two economies, intensity and structural composition of the exports.

The remainder of this paper is organized as follows. Section 2 summarizes the general context of the Greek export sector before and after the conjuncture of the economic crisis, as well as the background of Greek-Chinese trade relations to date. Section 3 presents the augmented gravity equation with the aim to assess the factors lying behind the export orientation of EU members, such as Greece, and discusses the empirical results. Section 4 initially analyses the Greek merchandise export structure during the pre- and post-crisis period, focusing further on exports to China. Finally, Section 5 concludes the paper, summarizing the main results and providing policy recommendations, directly or indirectly related to the Greek export sector.

2. Background

2.1. The Greek Export Sector

The Greek economy has been undergoing several structural reforms during the past few years, owing to a series of commitments and policy agendas having developed in light of the country's sovereign debt crisis. These reforms extend to almost every one of the economic and social aspects of the country, varying from labor costs and the national tax system to investment, international capital flows and trade. In this context, Greece's foreign trade strategic goals have been redefined on grounds of the global financial crisis, the Greek sovereign debt crisis, as well as the evolving policy directions implemented to overcome the domestic crisis. Export-oriented industries did not really grow in Greece in past decades, with the exception of those in tourism and sea-transport sectors (Schrader *et al.*, 2016). Past analyses (Manasse, 2016; De la Maisonnette, 2016) have highlighted some of the main features characterising the Greek export sector, such as the small size of the Greek firms (<10 employees), which makes foreign markets particularly inaccessible for them. Looking into the exports' compositional structure, low and medium-tech, labour-intensive commodities with low price elasticity and low added value, such as raw materials, metals and chemicals constitute the vast majority of exported goods. In contrast with

the service-export sector, the Greek merchandise export structure “*is remindful of the export patterns of low-income countries*” (Schrader *et al.*, 2016). Exports necessarily carry a high import content, that is, imported materials to be processed and then exported.

Greek exports were also affected in terms of competitiveness by the country’s accession to the Eurozone (Tsitouras, 2016). The conversion rate when the accession took place and the appreciation of the euro during the first three-year period after its introduction, constituted a competitive risk. The real effective exchange rate increased not only at the time of accession but also thereafter, rising inflation in an institutional environment where exchange rates are fixed. Other discouraging factors were the high profit margins that the national economy enjoyed after the 2000s, the increase of unit labour cost relative to Greece’s trading partners, as well as the fact that Greek manufacturing exports are dominated by low-tech products for which the country did not enjoy any advantage over emerging economies with relatively lower labour costs. Last but equally important, it should be mentioned that the lack of exporting culture as well as bureaucratic obstacles set by the Greek administration system, have made procedural matters – such as obtaining export licenses – very difficult to overcome.

Due to the global financial crisis, external demand declined as several of Greece’s trading partners were also hit by recession and, in this context, exporting activities were bound to deteriorate, particularly taking into account the conjuncture of capital controls in the Greek banking system. It is believed that the imposition of capital controls can exert a significant negative impact on exports, particularly on developing economies, through the channel of increasing transaction costs (Tamirisa, 1998). Kotidis and Malliaropoulos (2018) show that the observed decline in Greek exports during the period of capital controls is mainly due to the inability of firms to pay for imported raw materials rather than the lack of credit. They also highlight the serious impact of drastically imposing capital flows by the fact that, as is common practice, there rarely exists a timetable for gradually loosening capital controls.

After the Greek economy showed signs of economic depression and within the context of adjustment and structural reforms, export performance became one of the highest priorities for Greek governments. Export-led growth has been essential for all the National Growth Strategy plans implemented by successive governments. The Second Economic Adjustment Programme for Greece included the country’s obligation for strengthening the export sector, followed by the authorities’ adoption of two related action plans in 2012 and in 2016. The Greek government announced in 2012 the National Export Strategy through the National Trade Facilitation Strategy and Roadmap 2013-2014, which focused on enlarging its export base, on export promotion and trade facilitation (Hellenic Republic, 2012). In August 2015, the new government adopted the Third Economic Adjustment Programme which highlighted the

need for an update of the national strategy for exports. On this basis, the Greek Export Promotion Action Plan (Hellenic Republic, 2016) was introduced on March 2016, serving as an update of the National Export Strategy. Based on the previous document's pillars, the main objectives of this updated national strategy were to increase Greek exports by expanding the tradable products' markets and destinations, as well as the attraction of export-oriented foreign investing capital (FDI) with a focus on high value-added knowledge and technology-intensive sectors.

Several governmental reports have been produced in the subsequent years, stressing the need for export-oriented growth (Hellenic Republic, 2019). Implementation of these action plans has reportedly been variant (European Commission, 2019). Some of the actions taken include the creation of the state-led corporation "Enterprise Greece", which is responsible for the promotion and management of FDIs and exports, the creation and exploitation of a 'knowledge centre' of export-related data, statistics and other information, as well as the use of a helpdesk centre to provide guidance to potential exporters. In spite of a relatively weak productivity growth, improved competitiveness as well as rising external demand have had a positive effect on exports (OECD, 2018). The country still has, however, one of the lowest export performances, well below the EU average, while rising protectionism and signs of economic slowdown during 2019 have brought forward even lower expectations for export growth (Bank of Greece, 2019).

2.2. The Greek-Chinese trade relations

Even though the Greek state has had official diplomatic relations with the Peoples' Republic of China since 1972, economic relations remained rather typical for approximately three decades, accompanied by few bilateral agreements in this environment. A turning-point year for both countries towards improving Greek-Chinese relations was 2001, when China became a member of the World Trade Organization (WTO) and Greece proceeded with Eurozone membership. Seizing the opportunity for mutual cooperation as past-host (2004) and future-host (2008) countries through the joint Committee on Cooperation for the Olympic Games, Greece and China worked towards strengthening diplomatic and economic bonds and, as a result, exploring bilateral trade potentials. In this context, the 2006 Comprehensive Strategic Partnership Agreement served, among others, the purposes of developing cooperative ties between Greek and Chinese ports and shipping industries, as well as securing a direct maritime passage and transit transportation via the countries' ports to third countries, thus producing new dynamics (Skordeli, 2015).

In the wake of these developments came the global financial crisis and consequently the Greek sovereign debt crisis, which seemingly bore opportunities for both parties and especially for China, with respect to its

2013-launched Belt and Road initiative. Economic and commercial ties between the two countries have been regarded as a key answer to Greece's problems with respect to the economic turmoil which the country has been in for the past decade. On the other hand, Greece's strategic geographic position at the crossroads between Europe, Asia and Africa, along with the significant growth of the shipping sector, provide leverage against trading partners over the world. For China, expanding economic and commercial activities to Greece is crucial in order to attain improved access to the European markets and the South Mediterranean, and to achieve a substantial reduction of transportation costs (Tonchev and Davarinou, 2017).

Several diplomatic bilateral discussions have taken place in recent years exploring mutual benefits of cooperation, as previously mentioned in Karkanis (2018) and, on these grounds, Greek authorities welcomed the prospect of denationalization of the Piraeus port, which was ceded to the Chinese company COSCO in two stages, namely in 2008 and 2016 (Tonchev and Davarinou, 2017). Comparative advantages of the Piraeus port exceed its unique geographic position, as analysed in Davarinou *et al.* (2016). With regard to the overland routes to Europe, Greece became the 17th member of the 17+1 cooperation between the Central and Eastern European (CEE) states and China in 2019. Thus, bilateral agreements have been signed at an accelerating rate during the last 15 years, the shipping industry being the epicentre of the Greek-Chinese relations, while synergies in tourism, telecommunications, energy, finance and real estate have also developed substantially (Skordeli, 2015). The above are related to both bilateral trade and FDI.

Apropos of economic and commercial collaboration, the two parties have founded the Hellenic Chinese Chamber since 1995, as well as the China-Greece Joint Economic and Trade Committee, having held twelve sessions by 2017 (Tonchev and Davarinou, 2017). With respect to the general context of Greek external trade, imports from China greatly surpass exports, pointing to a consistently negative trade balance. However, given the Chinese government's 2015 pronouncement of boosting domestic consumption relative to previous investment-strengthening policies, it is expected that Chinese imports should be growing (Karkanis and Fotopoulou, 2019). This said, and taking into account Greece's strategic goal of further increasing exports, present and future prospects have to be studied in order to achieve a mutually beneficial relationship between the two partners.

3. The Gravity Model

3.1. Model specification

The first methodological step is based on the application of the augmented gravity model methodology, in order to produce empirical results on the factors lying behind the export orientation of EU members, including Greece, before

and after the outbreak of the economic crisis. The use of the Poisson Pseudo-Maximum Likelihood (PPML) estimator is well documented for estimating gravity equations (Truong *et al.*, 2019), especially in cases where a significant part of the sample contains zero-value observations (Santos Silva and Tenreyro, 2006). Despite their inclusion in the final sample being accepted as methodologically appropriate, a uniform way of treating them does not seem to exist in relevant studies (Linders and De Groot, 2006; Burger *et al.*, 2009). One appropriate solution is to replace zero values with the minimum uncensored value (Figueiredo *et al.*, 2015), which is the case for the present study where the minimum uncensored export value is equal to 1. For comparison purposes, the analysis also reports on the estimated coefficients provided each time by the OLS regressions. In this case, the estimations make use of the White's heteroskedasticity-consistent covariance matrix estimator in order to obtain robust standard errors.

The initial sample includes 95,812 observations referring to the export activity of the EU-28 countries before (2001-2009) and after the onset of the economic crisis (2010-2018), but also for the whole reference period (2001-2018) to 193 countries (Appendix I). The same choice is made in the case of the selected subset of five EU Mediterranean countries - France, Italy, Greece, Spain, Portugal - with similar or larger economies compared to Greece (17,200 observations). Methodologically, the inclusion of observations for trade between Member States - even between Member States and European countries before EU membership - is considered appropriate, in order to capture multilateral trade resistance effects (Anderson and Wincoop, 2003). The 28 countries compete not only with third countries in international trade, but also with each other. Furthermore, observations for 2001 have been included, in order to obtain similar sample sizes between the pre- and post-crisis periods both for the EU-28 and Mediterranean EU countries. With regard to the inclusion of multiple exporting and importing countries, this is a common methodological choice aimed at taking into account multilateral resistance effects on trade (Shepherd, 2013). The augmented gravity equation includes two main sets of variables: the time-invariant geographical and sociocultural variables, the data for which have been extracted from the CEPII GeoDist database (Mayer and Zignago, 2011), and the time-variant economic variables deriving from the UNCTADStat database (Appendix II). The general form of the augmented gravity model is described by the following equation:

$$\begin{aligned} \text{Ln}(\text{Exports})_{\text{dot}} = & \beta_0 + \beta_1 \text{Ln}(\text{distance})_{\text{do}} + \beta_2 (\text{landlocked})_{\text{d}} + \beta_3 (\text{landlocked})_{\text{o}} + \\ & + \beta_4 (\text{ethnic language})_{\text{do}} + \beta_5 (\text{colonial ties})_{\text{do}} + \beta_6 \text{Ln}(\text{GDP})_{\text{dt}} + \\ & + \beta_7 \text{Ln}(\text{GDP})_{\text{ot}} + \beta_8 \text{Ln}(\text{per capita GDP})_{\text{ot}} + \beta_9 (\text{PCI})_{\text{dt}} + \varepsilon \end{aligned} \quad (1)$$

The explanatory variables have been selected on the basis of a study by Santos Silva and Tenreyro (2006). The Product Concentration Index (PCI), otherwise known as the Herfindahl-Hirschmann Index (Product HHI) and ranging from 0 to 1, has also been introduced for imports of trading partners

of EU Member States. Particularly with regard to imports, the closer the PCI index is to the unit, the higher the concentration of a country's imports into a limited range of products will be. The relevant data are also available in the UNCTAD Stat database, while a similar variable has been used in other gravity models for trade (Karkanis, 2019).

The geographical variables reflect the discouraging role of trade costs on trade flow intensity. Apart from the well documented negative impact of geographical distance (for example, Kucera and Sarna, 2006), trade activity of landlocked countries is directly affected by neighbouring countries that have access to sea (Carrere and Grigoriou, 2011). For this reason, the sign of the corresponding coefficients - either for the EU Member States or for their trading partners - is expected to be negative (Santos Silva and Tenreyro, 2006). Conversely, the existence of cultural ties between exporter and importer countries can be considered as a factor of strengthening economic, and therefore trade relations between countries. The coefficients of the variables are expected to be positive for both of the cultural –linguistic elasticities, as is the case in the international literature (Santos Silva and Tenreyro, 2006; Zhang and Wang, 2015).

The variables concerning the GDP of exporter and importer countries serve as the typical masses of attraction and repulsion, respectively, in the gravity equation. Relevant data from the UNCTAD Stat database are employed in nominal values due to multilateral resistance effects that need to be included (Shepherd, 2013). The trading partners' per capita GDP is often included in gravity equations (Santos Silva and Tenreyro, 2006) in order to capture the positive effect of purchasing power of the destination countries; therefore, the sign of the respective coefficients is expected to be positive.

3.2. Empirical results

The interpretive value of the regressions in both groups of exporting countries is in each case satisfactory (Tables 1 and 2). It should be noted that differences between the pooled OLS and PPML coefficients' signs are limited in the cases of exporter GDP and importer per capita GDP elasticities. The OLS coefficients were checked for robustness by way of applying the standard bootstrap methodology and a resampling into 1000 samples, as is commonly the case in the relevant literature (Davison and Hinkley, 1997; Efron and Tibshirani, 1993). No collinearity problems were detected between the variables finally introduced into the augmented gravity model.

The empirical results indicate an almost consistently positive sign of the elasticity for the product concentration index both in the case of the EU-28 group and the subset of the five selected countries. *Ceteris paribus*, the higher the concentration of imports on few products – and thus the higher the product concentration index – the greater the import intensity in destination countries. This finding is probably related to the case of China as importer country, whose

PCI remains still consistently higher than in most EU or developed countries during the period under study (UNCTADStat data). According to the same source, the PCI for Chinese imports has been characterised by a gradually increasing trend, from 0.11 in 2002 to 0.17 in 2018, being similar to the corresponding index for India (0.19) and almost identical to that of Greece. The relationship between trade structures and bilateral trade flows has been highlighted in the existing literature (Karkanis, 2019) and confirmed in the present study.

The differences between GDP exporter coefficients reflect the differentiated impact of the economic crisis on EU Member States and especially in the Mediterranean EU countries. Between the two time-periods, these coefficients lose their statistical significance during the second half of the period (2010-2018). Comparing the results for the group of 28 Member states and the subset of the five countries, it becomes clear that the economic contraction that took place mainly in the latter economies calls for the intensification of their commercial activities, in order to attract new capital from abroad. Greece serves as a typical example.

Table 1: Results: EU-28 Members

<i>Estimator:Time period:</i>	OLS		PPML		OLS		PPML	
	2001-18	2001-18	2001-09	2001-09	2010-18	2010-18	2010-18	2010-18
Ln distance	-1.408*** (-126.711)	-0.085*** (-124.03)	-1.400*** (-83.104)	-0.086*** (-81.29)	-1.419*** (-96.873)	-0.085*** (-94.66)		
Common ethnic language	0.471*** (10.036)	0.030*** (9.72)	0.592*** (8.934)	0.038*** (8.78)	0.352*** (5.299)	0.021*** (4.99)		
Colonial ties	3.062*** (63.705)	0.171*** (50.99)	3.208*** (46.696)	0.182*** (37.21)	2.917*** (43.715)	0.161*** (35.10)		
Landlocked destination	-0.480*** (-18.212)	-0.023*** (-12.84)	-0.490*** (-12.487)	-0.026*** (-9.35)	-0.474*** (-13.421)	-0.021*** (-8.83)		
Landlocked origin	-0.728*** (-36.459)	-0.050*** (-36.16)	-0.706*** (-24.093)	-0.050*** (-24.13)	-0.749*** (-27.641)	-0.050*** (-27.13)		
Ln GDP - destination	1.088*** (249.237)	0.721*** (227.25)	1.074*** (167.520)	0.726*** (155.13)	1.100*** (185.251)	0.717*** (166.25)		
Ln GDP - origin	0.121*** (3.298)	0.133*** (5.12)	0.088* (1.780)	0.085** (2.41)	-0.019 (-0.191)	0.096 (0.95)		
Ln Per capita GDP - destination	0.017** (2.316)	-0.004*** (-7.57)	0.018* (1.731)	-0.004*** (-5.10)	0.015 (1.479)	-0.004*** (-6.01)		
PCI - destination	2.949*** (26.373)	0.191*** (23.09)	2.948*** (19.498)	0.195*** (16.86)	2.938 (17.603)	0.190*** (15.92)		
Durbin-Watson	1.640		1.680		1.653			
Adjusted R ²	0.594	0.573	0.570	0.551	0.613	0.590		
Observations	95,812	95,812	47,742	47,742	48,070	48,070		

Note: OLS estimations use White's heteroskedasticity-consistent covariance matrix estimator. t-Statistics are in parentheses. *** means $p < 0,01$, ** means $p < 0,05$, * means $p < 0,1$.

Sharp contraction of the Greek GDP during the period of economic crisis – which comprises essentially the second half of the period under study – contributed to the urgent reduction of the trade deficit along with the constant increase in export flows. The negative sign of the elasticity for Greek per capita GDP justifies the strategic shift of the Greek economy in order to boost export growth and, consequently, to ensure financial liquidity during the crisis period. Subsequently, the usually positive (Table 1) sign of GDP exporter coefficient now turns negative (Table 2). It is therefore obvious that the economic crisis and especially its spill over on Southern European countries has biased the results obtained for the exporter GDP coefficients.

Different selections of groups of exporting and importing countries can potentially alter the expected empirical results. Considering PPML estimates as more consistent for gravity modelling of trade, the empirical results suggest that, *ceteris paribus*, higher per capita GDP levels in importer countries can serve as a discouraging factor for European exports. This is not the case for the corresponding OLS estimated coefficients, where only positive signs are observed.

Table 2: Results: Five Mediterranean EU Members

Estimator:Time period:	OLS	PPML	OLS	PPML	OLS	PPML
	2001-18	2001-18	2001-09	2001-09	2010-18	2010-18
Ln distance	-1.461*** (-73.687)	-0.084*** (-70.36)	-1.447*** (-48.451)	-0.084*** (-46.61)	-1.473*** (-55.831)	-0.084*** (-52.74)
Colonial ties	2.791*** (55.433)	0.158*** (48.16)	2.810*** (37.367)	0.161*** (33.09)	2.772*** (41.385)	0.154*** (35.16)
Landlocked destination	-0.744*** (-15.625)	-0.038*** (-12.89)	-0.716*** (-10.207)	-0.039*** (-8.67)	-0.770*** (-11.944)	-0.038*** (-9.59)
Ln GDP - destination	1.023*** (115.687)	0.617*** (102.21)	1.005*** (79.715)	0.613*** (70.98)	1.041*** (83.786)	0.622*** (73.41)
Ln GDP - origin	-0.281*** (-3.864)	-0.132*** (-2.77)	-0.284*** (-2.887)	-0.152** (-2.41)	0.296 (1.090)	0.330 (1.30)
Ln Per capita GDP - destination	0.059*** (4.472)	-0.0002 (-0.29)	0.072*** (3.761)	0.0006 (0.50)	0.050*** (2.715)	-0.001 (-0.97)
PCI - destination	3.461*** (16.014)	0.210*** (14.84)	3.340*** (11.163)	0.204*** (10.10)	3.615*** (11.556)	0.219*** (11.13)
Durbin-Watson	1.827		1.842		1.816	
Adjusted R ²	0.676	0.652	0.657	0.634	0.692	0.666
Observations	17,200	17,200	8,570	8,570	8,630	8,630

Note: OLS estimations use White's heteroskedasticity-consistent covariance matrix estimator. t-Statistics are in parentheses. *** means $p < 0,01$, ** means $p < 0,05$, * means $p < 0,1$.

The existence of mixed or negative signs in the coefficient of importer countries' per capita GDP has been recorded in the relevant literature. Yu (2010) reports on mixed-sign coefficients in the case of inclusion – or exclusion – of institutional variables in the gravity equation. While studying Korea's trade

with ASEAN countries, Truong et al (2019) report similar fluctuations, when bilateral trade involves goods at different stages of processing. In the present study, it is considered that the negative sign is a result of the already high per capita GDP of exporter, compared to the majority of importer countries, thus reinforcing the initial argument that the choice of trading partners can affect the empirical results.

4. The Greek Export Structure

The second stage of the methodological approach is based on the structural analysis of total Greek merchandise exports, focusing on those directed towards China. This research consists of an analytical breakdown of Greek exports by country of destination and product category (3-digit SITC classification), which helps to identify the composition of the main exported products, first worldwide and, second, towards China, in the years following the euro adoption. Merchandise export data by exporting/importing country and by product category have been extracted from the UNCTADStat database for the reference period between 2002 and 2018. In any case, the analysis is limited to the 30 most exported product categories, in terms of export value, namely those which account for more than 50% of the total value of Greek exports, worldwide and towards China (see Tables 4 and 5).

4.1. The Greek exports worldwide

The role of geographical proximity is particularly important for export sectors of national economies by the size of Greece. The country's exports are mainly directed to the nearest European national markets – Italy, Cyprus, and Bulgaria – as well as towards large-market economies (Germany, the United Kingdom, and the United States). Previous studies have highlighted the role of the Greek diaspora in boosting export growth towards the destination countries (for olive oil exports, see Vlontzos and Duquenne, 2008). The recent continuation of the overall upward trend (2015-2018) is mainly due to the intensification of exports to the nearest Mediterranean or other neighbouring countries (Italy, Cyprus, Bulgaria, and Romania). It seems that liquidity problems in the Greek economy have intensified the need of reducing transportation costs, thus shaping the direction of Greek exports (Table 3). It also appears that the share of Greek exports towards China to the total of Greek exports, as well as their contribution to the total increase in Greek exports, are becoming increasingly important, particularly while proceeding towards the most recent period. It can be argued, therefore, that there exists considerable potential for further development of trade relations between the two countries, at least with regard to Greek exports.

As is the case for the entire period, the recent increase in export value is based on exports of crude minerals, such as aluminum and copper, while the contribution of medicaments and agri-food products in exports also seem perennially significant (Table 4). The latter are expected to further expand as

Table 3: Greek Export Value by Partner (% of total export value) and Contribution (%) to the total increase of Greek Export Value

Partner / Year	Percentage of total Greek export value (%)			Contribution to total increase of Greek export value (%)		
	2002	2012	2018	2002-2018	2012-2018	2015-2018
Italy	8,3	6,9	8,4	8,4	14,1	5,5
Germany	10,4	6,4	6,2	3,2	5,3	2,9
Cyprus	4,5	3,7	4,5	4,5	7,7	6,9
Bulgaria	5,1	4,2	4,3	3,8	4,7	4,3
United States	4,4	2,5	3,5	2,9	7,5	1,3
United Kingdom	6,0	3,0	3,0	1,0	3,0	-0,1
France	3,5	2,3	2,9	2,5	5,5	4,7
Romania	2,7	2,1	2,9	3,1	6,2	3,5
Spain	2,5	1,5	2,7	2,9	7,5	4,0
Turkey	2,8	3,1	2,4	2,1	-0,4	-1,2
Netherlands	2,4	1,5	1,9	1,5	3,2	1,8
Poland	1,1	1,0	1,4	1,7	3,3	1,8
China	0,5	1,1	1,4	2,0	2,6	3,2
Albania	2,8	1,3	1,2	0,1	0,9	1,6
Israel	1,0	0,5	0,9	0,9	2,8	2,1
Russian Federation	2,8	1,7	0,6	-0,9	-3,7	0,1

Source: UN COMTRADE / UNCTADStat, and own calculations. Note: Export values by partner country do not include exports of petroleum products.

financial liquidity issues are gradually resolved, along with the complete abolition of capital controls by the Greek governments. The gradual redefinition of the cooperative culture of Greek producers – given the relatively fragmented rural property in the country – is expected to further contribute to this end, in conjunction with the vertical integration of production (processing of agricultural products), which can significantly increase the profitability of Greek producers. It is also expected that exports of high-tech products, with the exception of pharmaceuticals, will not be at the forefront of Greek exports in the near future, this lack of competitiveness owing mainly to insufficient investments in the specific sector, as well as scarce resources for processing of raw materials.

The country's export structure reflects its productive base: high dependence on exports of agri-food products and raw materials, even with changes and/or fluctuations throughout time. Exports of industrial plants in raw form (tobacco and cotton) have been losing ground in recent years, while the share of processed tobacco exports has increased. Considering, at the same time, the limited domestic resources, it should be reminded that the export sector was affected by the imposition of capital controls, due to the high reliance on imports of raw materials for manufacturing.

Table 4: Greek Merchandise Exports by Product (% of total export value)
SITC classification, 2002-2018

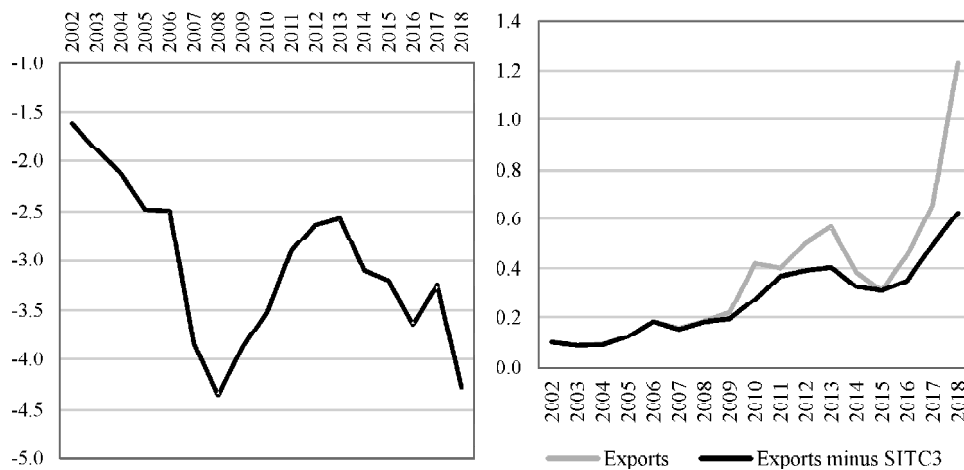
SITC product / Period	2002- 09	2010- 12	2013- 15	2016- 18
[684] Aluminium	5,04	6,19	6,91	7,35
[542] Medicaments (incl. veterinarymedicaments)	5,64	5,82	5,86	6,00
[057] Fruits and nuts (excluding oil nuts), fresh or dried	3,48	4,31	4,52	4,17
[421] Fixed vegetable fats & oils, crude, refined, fractio.	2,35	1,95	2,98	3,13
[056] Vegetables, roots, tubers, prepared, preserved, n.e.s.	2,26	2,67	2,97	3,05
[034] Fish, fresh (live or dead), chilled or frozen	2,37	3,12	2,84	2,85
[752] Automatic data processing machines, n.e.s.	0,28	0,22	1,44	2,63
[682] Copper	2,36	2,67	2,55	2,62
[024] Cheese and curd	1,11	1,55	1,97	2,16
[058] Fruit, preserved, and fruit preparations (no juice)	2,24	2,32	2,36	1,95
[661] Lime, cement, fabrica. constr. mat. (excludingglass, clay)	1,79	1,53	2,07	1,85
[263] Cotton	2,13	2,25	1,94	1,71
[676] Iron & steel bars, rods, angles, shapes & sections	1,17	2,62	1,43	1,64
[122] Tobacco, manufactured	1,08	1,16	1,38	1,53
[582] Plates, sheets, films, foil & strip, of plastics	1,48	1,48	1,55	1,51
[893] Articles, n.e.s., of plastics	1,15	1,14	1,38	1,44
[098] Edible products and preparations, n.e.s.	0,63	0,98	1,14	1,29
[273] Stone, sand and gravel	0,36	0,65	0,80	1,27
[679] Tubes, pipes & hollow profiles, fittings, iron, steel	1,77	1,38	1,16	1,25
[575] Other plastics, in primary forms	1,02	1,31	1,26	1,20
[894] Baby carriages, toys, games & sporting goods	0,40	0,69	0,88	1,18
[773] Equipment for distributing electricity, n.e.s.	1,65	1,67	1,33	1,18
[764] Telecommunication equipment, n.e.s.; & parts, n.e.s.	1,74	1,58	1,40	1,16
[048] Cereal preparations, flour of fruits or vegetables	0,90	0,82	0,90	1,14
[553] Perfumery, cosmetics or toilet prepar. (excludingsoaps)	1,30	0,98	1,05	1,12
[844] Women's clothing, of textile, knitted or crocheted	3,69	1,38	1,29	1,04
[022] Milk, cream and milk products (excluding butter, cheese)	0,44	0,53	0,86	1,01
[121] Tobacco, unmanufactured; tobaccorefuse	1,98	1,33	1,03	1,00
[699] Manufactures of base metal, n.e.s.	0,75	0,71	0,93	0,99
[598] Miscellaneous chemical products, n.e.s.	0,61	0,65	0,85	0,94
	53,17	55,63	59,01	61,33

Source: UN COMTRADE / UNCTADStat, and own calculations.

4.2. Greece's export performance to China

China is one of the largest trading economies worldwide, having already achieved economic penetration across all geographical continents. The transit role of the port of Piraeus for the Chinese products' entry to the European market is well renowned, to the extent that a large part of the port's operations is managed by the State-owned Chinese ocean shipping company COSCO. At the same time, boosting export activity has been one of the key strategic pillars for the recovery of the Greek economy, as an aftermath of the global

economic crisis. The Greek-Chinese trade balance has been extremely negative over time (Figure 1a). However, the increasing trend of Greek exports towards China illustrates the ever-growing interdependence between the two economies. The negative impact of the crisis and, even more, the strong uncertainty after the imposition of capital controls are more than evident (Figure 1b). Trade with distant markets requires the necessary guarantees in order to complete trade transactions, including cash transactions, thus capital controls do not contribute to this end.



Figures 1a, 1b: Greek Trade Balance with China (left) and Value of Greek Exports to China (right)

Source: UN COMTRADE / UNCTADStat, values (right) in billion 2010 constant dollars.

Crude inedible materials consistently account for the main bulk of Greek exports during the period under consideration, marble exports being the most important exported product to China over time (273 code – Table 5). Dependence on exports of raw and low added-value products remains significant both before and after the outbreak of the economic crisis. What distinguishes the most recent trade performance is the fact that all five most exported products to China are crude inedible materials, accounting for about 73% of the total export value during the period 2016-2018 (excluding petroleum products). The exports of cotton, pulp and paper as well as metal waste are steadily of major importance throughout the whole period. Stimulating household consumption in China is related to the urbanization process, which in turn requires the widespread availability of housing stock in the ever expanding urban areas. Greek exports of aluminum and other fabricated construction materials constantly respond to China’s needs for the construction sector. As for machinery and transport equipment, the share of this specific

category did not change significantly after the onset of the economic crisis, although more SITC-7 product groups are listed in the 30 most exported to China. The availability and, as a result, exports of manufactured products included in SITC-6 and SITC-7 categories are often dependent on Greek imports of raw materials. The restrictions on capital outflows due to the enforcement of capital controls from 2015 onwards in Greece could only complicate the purchase of crude materials from external markets. This may partly account for the increased volatility observed in the set of main exported products concerning the specific product categories.

Table 5: Greek Merchandise Exports to China by Product Percentage (%) of Total Export Value - SITC Classification

<i>SITC product / Period</i>	<i>2002-09</i>	<i>2010-12</i>	<i>2013-15</i>	<i>2016-18</i>
[273] Stone, sand and gravel	21,47	29,04	37,52	54,93
[263] Cotton	5,46	16,65	5,03	6,65
[251] Pulp and wastepaper	3,75	3,95	4,41	4,88
[289] Ores & concentrates of precious metals; waste, scrap	0,00	0,00	1,70	3,59
[288] Non-ferrous base metal waste and scrap, n.e.s.	17,05	14,40	6,15	3,34
[542] Medicaments (incl. veterinarymedicaments)	0,15	0,26	0,82	3,02
[743] Pumps (excluding liquid), gas compressors & fans; centr.	0,03	0,07	0,46	1,91
[531] Synth. organic colouring matter & colouring lakes	1,15	1,09	1,96	1,71
[713] Internal combustion piston engines, parts, n.e.s.	0,14	0,06	1,68	1,18
[684] Aluminium	7,60	4,79	4,53	1,16
[714] Engines & motors, non-electric; parts, n.e.s.	0,02	0,00	0,64	1,06
[772] Apparatus for electrical circuits; board, panels	0,11	0,44	0,89	1,00
[661] Lime, cement, fabrica. constr. mat. (excludingglass, clay)	0,60	0,57	0,68	1,00
[775] Household type equipment, electrical or not, n.e.s.	0,10	0,06	1,96	0,97
[421] Fixed vegetable fats & oils, crude, refined, fractio.	2,39	2,66	2,03	0,87
[872] Instruments & appliances, n.e.s., for medical, etc.	0,11	0,03	0,03	0,87
[057] Fruits and nuts (excluding oil nuts), fresh or dried	0,01	0,21	0,97	0,85
[613] Furskins, tanned or dressed, excluding those of 8483	0,97	3,09	2,27	0,73
[562] Fertilizers (other than those of group 272)	2,06	0,05	0,99	0,60
[048] Cereal preparations, flour of fruits or vegetables	0,17	0,38	0,60	0,47
[059] Fruit and vegetable juices, unfermented, no spirit	0,01	0,01	0,15	0,44
[582] Plates, sheets, films, foil & strip, of plastics	0,22	0,12	0,09	0,37
[112] Alcoholicbeverages	0,10	0,55	1,75	0,30
[892] Printedmatter	0,04	0,02	0,23	0,28
[771] Electric power machinery, and parts thereof	0,81	0,18	0,21	0,26
[579] Waste, parings and scrap, of plastics	0,36	1,15	0,70	0,25
[724] Textile & leather machinery, & parts thereof, n.e.s.	4,92	0,16	0,15	0,25
[821] Furniture&parts	0,05	0,06	0,13	0,24
[764] Telecommunication equipment, n.e.s.; & parts, n.e.s.	0,47	0,12	0,35	0,22
[553] Perfumery, cosmetics or toilet prepar. (excluding soaps)	0,15	0,15	0,18	0,22
	70,5	80,3	79,3	93,6

Source: UN COMTRADE / UNCTADStat, and own calculations.

By far the most significant change in chemical product exports concerns the recent upward trend in the medicaments sector. The introduction of generic medicines renders the production and exports of pharmaceuticals less dependent on human capital, since they do not require original pharmaceutical research (Schrader *et al.*, 2016). Generic products are typically more competitive as they retain the same active substance as the original medicines, while being kept at lower prices than the latter. The European pharmaceutical market and, consequently, the Greek market, could be significantly benefited in the future by the gradual penetration of Western medicine into the vast Chinese domestic market, as well as by the ongoing ageing process of the European population. Combined with the highly specialized human resources in the medical and biotechnology sectors, the potential for transfer of know-how from foreign companies in Greece can prove beneficial for further expanding exports.

Limited dependence on external markets for verticalising agri-food production processes, as well as the mild Mediterranean climate in Greece, facilitate exports of food products, olive oil and alcoholic beverages even as far as China. The main exported products mainly concern fruits and nuts, fruit or vegetable juices and cereal preparations. The overall upward trend in exports to China is certainly associated with the gradual improvement in the living standards of the Chinese population during the last decades, resulting in a sharp increase in consumer demand patterns. Increasing arrivals of Chinese tourists, as well as their familiarization with the Mediterranean diet, can only contribute to this end. However, the inherent comparative advantage regarding favourable climatic conditions cannot by itself guarantee the perpetual rise of the sector's exports. The agricultural sector in Greece is distinguished by a well fragmented rural land, the ownership of which is mostly attributed to the ageing population. In addition, the decline of the rural cooperatives sector in previous years still hampers the effective promotion of Greek agri-food products, especially taking into consideration the inherently limited availability of natural resources.

5. Conclusions and Policy Implications

China and Greece constitute two of the most important naval powers worldwide. Despite the barriers set by geographical distance – which undoubtedly increases trade costs – and the lack of common cultural characteristics – represented in the gravity equation by the linguistic and colonial dimension, the role of a long-standing historical heritage in bilateral relations cannot be questioned. In purely economic terms, the strategic position of the Port of Piraeus is crucial for the penetration of Chinese products in European markets. China's PCI for imports is higher than the corresponding indices of all EU countries (at least for 2018), except for those of Cyprus and Malta. The ongoing growth process of the Chinese economy, along with the

gradual changes in the living standards of Chinese citizens, is expected to induce a more homogeneously distributed range of imported products.

Trading with a distant but major economic power such as China clearly reshapes the structure of the country's exports to this specific destination, compared to the total Greek export structure. Higher trade costs, as well as limited internal resources, hinder export profitability of agri-food products to distant countries. This becomes evident in the present study, given the limited representation of SITC-0 products in the set of major exported products to China, compared to total Greek exports. Further development of processing activities in the agri-food sector can contribute to the revitalization of the agricultural sector, combined with the deployment of a younger, well-educated, specialized workforce with technical knowledge. A thorough redefinition of the cooperative culture among producers of agricultural products in Greece could help to cope with higher transport costs, given the increasing external demand for high quality food products. Exports of SITC-7 (machinery and transport equipment) and other manufactured products find greater resonance in the Chinese domestic market. Due to the relative lack of heavy industries in Greece and to the low availability of raw materials for the industry sector, these products are usually imported from the EU or third countries, processed domestically, and finally exported to China.

Exports of crude materials such as marble, cotton and metal scrap, simply maintain their high contribution rates in the mixture of major exported products to China - as was also the case before the economic crisis - in order to fuel both the booming construction sector and other domestic manufacturing activities in China. The results of the structural analysis are yet another proof of the Chinese high demand for products that will, either directly or indirectly, meet the ever growing consumer needs of urban households, namely for urban housing, healthcare, and high-value agri-food products. The prospects for exporting pharmaceuticals to China may prove particularly positive, given both the gradual introduction of Western medicine into the vast Chinese market, along with the population ageing process. The availability of highly specialized human resources in the fields of medicine and biotechnology, the prospects for the transfer of know-how from foreign enterprises, as well as the expansion of the generic medicine market could help in this direction.

Beyond the painful consequences of the economic crisis, the aftermath proved to be rather a resilience test for the Greek economy. Except for the United States and China, the country's export destinations are mostly European and Middle Eastern countries, reminding that scarce natural resources and the limited production of more sophisticated products are some of the factors that limit the geographical extent of Greek export flows. Several policies have attempted to encourage the competitiveness of the Greek economy by fostering growth of the export sector and increasing the added value of tradable products. Recent meetings at high political levels held both in Beijing and Athens in 2019 open

up new perspectives in the fields of bilateral trade, banking and shipping, cultural and research collaborations, thus providing a greater opportunity for the promotion of cooperation ties between the two partners. Cultural exchange between the two countries, given the increasing mobility of Chinese tourists towards Greece, should certainly play a key role in boosting Greek exports to China, even if the mobility of tourists worldwide has been temporarily limited due to the pandemic crisis. Bridging Greek-Chinese relations through the channels of tourism and culture can build a win-win strategy for both actors.

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Appendix I: The sample of 193 destination countries or territories

<i>Afghanistan</i>	<i>Czechia</i>	<i>Kyrgyzstan</i>	<i>St. Kitts and Nevis</i>
Albania	Denmark	Lao People's Dem. Rep.	St. Lucia
Algeria	Djibouti	Latvia	St. Vincent & the Grenadines
Andorra	Dominica	Lebanon	Samoa
Angola	Dominican Republic	Lesotho	Sao Tome and Principe
Anguilla	Ecuador	Liberia	Saudi Arabia
Antigua and Barbuda	Egypt	Libya	Senegal
Argentina	El Salvador	Lithuania	Seychelles
Armenia	Equatorial Guinea	Luxembourg	Sierra Leone
Australia	Eritrea	Madagascar	Singapore
Austria	Estonia	Malawi	Slovakia
Azerbaijan	Eswatini	Malaysia	Slovenia
Bahamas	Ethiopia	Maldives	Solomon Islands
Bahrain	Fiji	Mali	Somalia
Bangladesh	Finland	Malta	South Africa
Barbados	France	Marshall Islands	Spain
Belarus	French Polynesia	Mauritania	Sri Lanka
Belgium	Gabon	Mauritius	State of Palestine
Belize	Gambia	Mexico	Sudan
Benin	Georgia	Micronesia (Fed. States)	Suriname
Bermuda	Germany	Mongolia	Sweden
Bhutan	Ghana	Morocco	Switzerland
Bolivia (Plurin. State)	Greece	Mozambique	Syrian Arab Republic
Bosnia & Herzegovina	Greenland	Myanmar	Tajikistan
Botswana	Grenada	Namibia	Thailand
Brazil	Guatemala	Nauru	Togo
British Virgin Islands	Guinea	Nepal	Tonga
Brunei Darussalam	Guinea-Bissau	Netherlands	Trinidad and Tobago
Bulgaria	Guyana	New Caledonia	Tunisia
Burkina Faso	Haiti	New Zealand	Turkey

contd. appendix I

<i>Afghanistan</i>	<i>Czechia</i>	<i>Kyrgyzstan</i>	<i>St. Kitts and Nevis</i>
Burundi	Honduras	Nicaragua	Turkmenistan
Cabo Verde	Hungary	Niger	Turks and Caicos Islands
Cambodia	Iceland	Nigeria	Tuvalu
Cameroon	India	North Macedonia	Uganda
Canada	Indonesia	Norway	Ukraine
Cayman Islands	Iran (Islamic Rep.)	Oman	United Arab Emirates
Central African Rep.	Iraq	Pakistan	United Kingdom
Chad	Ireland	Palau	United States of America
Chile	Israel	Panama	Uruguay
China	Italy	Papua New Guinea	Uzbekistan
Colombia	Jamaica	Paraguay	Vanuatu
Comoros	Japan	Peru	Venezuela (Bol. Rep.)
Congo	Jordan	Philippines	Viet Nam
Cook Islands	Kazakhstan	Poland	Yemen
Costa Rica	Kenya	Portugal	Zambia
Cote d'Ivoire	Kiribati	Qatar	Zimbabwe
Croatia	Korea, DPR of	Romania	
Cuba	Korea, Republic of	Russian Federation	
Cyprus	Kuwait	Rwanda	

Appendix II: Variables and data sources

Variable	Description	Source
Exports	EU member merchandise export value by destination (natural logs)	UN COMTRADE, UNCTAD, IMF, Eurostat.
Distance	Distance between origin and destination (natural logs)	CEPII GeoDist database, <i>distwces</i> variable
Landlockedorigin country	Dummy for landlocked origin countries, 0 or 1	Own calculations
Landlocked destination country	Dummy for landlocked destination countries, 0 or 1	Own calculations
Common ethnic language	Common ethnic language in destination countries, 0 or 1	CEPII GeoDist database, <i>comlang_ethno</i> variable
Colonial ties	Colonial ties between origin and destination country, 0 or 1	CEPII GeoDist database, <i>colony</i> variable
GDP - origin	GDP in origin country (natural logs)	UNCTAD secretariat estimates
GDP - destination	GDP in destination country (natural logs)	UNCTAD secretariat estimates
Per capita GDP – destination	Destination's per capita GDP	UNCTAD secretariat estimates
PCI - destination	Product Concentration Index in destination country (China)	UNCTAD secretariat estimates