



*Olive Oil:
Establishing the
Greek brand*

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- Greece is the third largest producer of olive oil in the world (11 per cent of total volume production), following Spain (40 per cent) and Italy (14 per cent). Indeed, Greek olive oil is of superior quality, since 80 per cent of production is extra virgin olive oil (compared with 65 per cent in Italy and 30 per cent in Spain).
- The increasing popularity of the healthy Mediterranean diet, and especially olive oil, has more than doubled demand for olive oil in other countries (apart from the 3 main producers) during the past 20 years.
- Despite the comparative advantages of Greek olive oil:
 - Only 27 per cent of Greek production reaches the stage of labeling/branding, compared with 50 per cent in Spain and 80 per cent in Italy, with the remainder sold in bulk form, including 70 per cent of exports (mainly to Italy for re-export).
 - Greece's market share in the world market of branded olive oil decreased from 6 per cent during the 1990s to 4 per cent during the past 5 years.
- Greek producers have failed to benefit from the global growth in olive oil demand, mainly due to structural problems:
 - The cost of olive production is relatively high in Greece (about €1/kg of olives, compared with €0.6/kg in Spain), mainly because of the small size and low labor productivity of olive farms.
 - Most olive mills in Greece are smaller and less advanced (in terms of technology) than those in Spain, leading to higher milling costs (€0.19/kg of olive oil for Greek mills, compared with €0.16/kg of olive oil for Spanish mills). In Italy, even though the mills are also small, they are vertically integrated with the olive farming stage, as well as the distribution stage.
 - The fragmented nature of Greek olive oil cooperatives does not facilitate the standardization of quality control, which is necessary for the promotion of premium olive oil.
 - The small size of bottling and labeling companies does not allow for the successful promotion of branded products.
- Despite the expected further increase in olive oil demand (mainly in other countries, i.e. apart from the main producers), the gradual decrease in CAP subsidies for Greek olive oil is expected to make small producers, with low productivity, unprofitable. As a result, Greek olive oil production is expected to decline to 280,000 tons in 2020 compared with an annual average of 310,000 tons during the past 5 years.
- In the medium term, provided that certain structural changes are undertaken, increasing global demand and the superior quality of Greek olive oil should result in more value added for the Greek sector. In particular, a shift from bulk to branded olive oil and a more efficient marketing strategy could increase the value of Greek exports by approximately €250 million (about 80 per cent higher than 2014). Indeed, a more vertically integrated production structure would increase the efficiency of the sector, strengthen its marketing strategy, and consequently prove favorable for a successful branding of Greek olive oil.

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Olive oil is one of the leading products of the Greek agricultural sector, covering 9 per cent of total production value (compared with 1 per cent in Europe). Greece ranks third in global olive oil production (after Spain and Italy), with an average annual production of about 0.3 million tons which contributes approximately 0.4 per cent of GDP (or €750 million) per year, on average, during the past 5 years¹, compared with 0.3 per cent in Spain and 0.1 per cent in Italy.

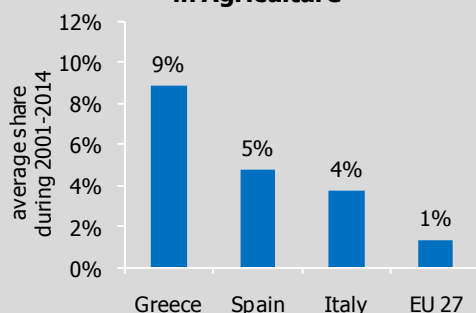
Led by Spain, world production of olive oil increased significantly (about 90 per cent) over the past 25 years. While the top three producers (Spain, Italy and Greece) continue to absorb about ½ of world olive oil consumption, the increased production was mainly absorbed by non-producing countries, whose demand more than doubled due to an increasing awareness of the health benefits of olive oil compared with other vegetable oils.

During this surge in global demand for olive oil, Greece did not succeed in exploiting its comparative advantage in terms of quality. On the contrary, production remained low (with a downward trend during the past 5 years), causing the Greek market share in global production to decline from 19 per cent in 1990 to 11 per cent in 2014.

The reduction in Greek production was more than offset by lower domestic consumption, which led to higher exports. Nevertheless, Greece's export market share declined in a booming international market. Specifically:

- ✓ Though Greece has one of the highest levels of olive oil consumption per capita, consumption has been declining continuously, to 16 kg per capita in 2014 from 20 kg per capita in 1990 (versus around 11 kg per capita in Spain and Italy). Olive oil has been substituted by other cheaper vegetable oils, covering 55 per cent of total vegetable oil consumption in Greece in 2014 compared with 10 per cent in 1980.
- ✓ The export orientation of the Greek production has increased during the past 2½ decades – in particular, exports covered 42 per cent of production during the past 5 years compared with 35 per cent during the 1990s.

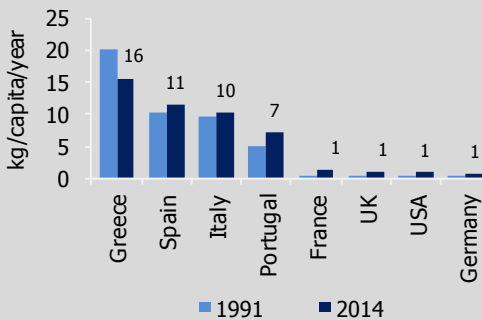
Share of Olive Oil Production in Agriculture



Source: Eurostat

¹ Excluding 2014 (harvest of 2013) when production fell sharply due to adverse weather conditions.

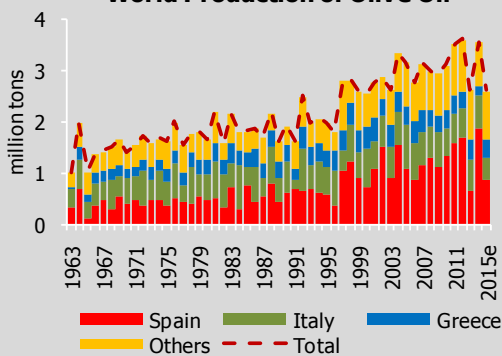
Per capita consumption of olive oil



* not including consumption other than food (e.g. soap), ranging from 30 to 90 mil. tons annually for the top 3 producers.

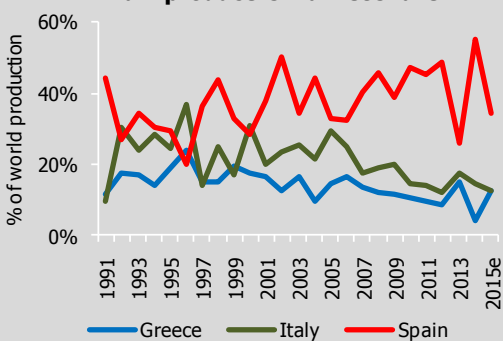
Source: International Olive Oil Council

World Production of Olive Oil



Source: Faostat, IOOC estimates

World Production of Olive Oil - main producers market share* -



* including both branded and bulk olive oil.

Source: International Olive Oil Council (IOOC)

However, Greek exporters lost market share in both: i) the important Italian market, comprising the export of olive oil in bulk form (covering 17 per cent of Italian imports during 2011-2014, compared with 33 per cent during the '90s); and ii) the international market for branded olive oil (4 per cent market share, compared with 6 per cent during the '90s), which is dominated by Spain and Italy, with the gradual entrance of new players e.g. Tunisia and Portugal.

Apart from the loss in market share, the Greek olive oil sector has also lost significant potential because of its high share of sales in the form of bulk olive oil in both the domestic and international market (in contrast to higher value added branded olive oil), partly due to ineffective organization. Against this background, the focus of our analysis is to explore the sector's potential in light of the favorable conditions in the international market (i.e. new competitors as well as new markets) and the imminent changes stemming from CAP reform.

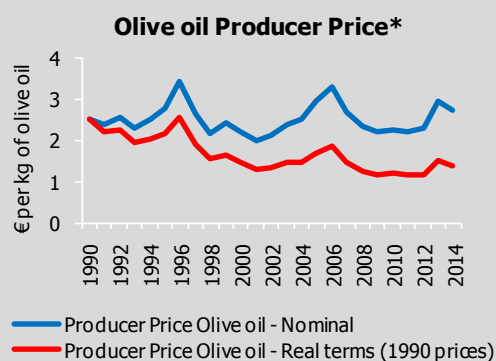
1. WORLD OLIVE OIL MARKET

Led by Spain, olive oil production almost doubled and prices fell...

With Spain as the driving force, olive oil production has experienced an upward trend during the past 25 years - reaching 2.8 million tons in 2014 from about 1.5 million tons in 1990². World production is mainly concentrated in the Mediterranean basin where the climate is favorable. In particular, the main producers are Spain, Italy and Greece, accounting for about 3/5 of world production:

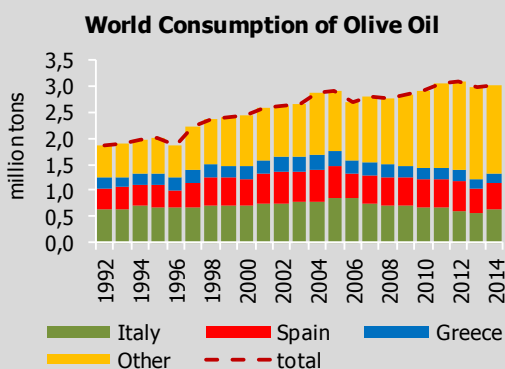
- ✓ Spain is the undisputed leader of the sector (about 40 per cent of global production), to a large extent driving changes in world production. Specifically, through the introduction of new techniques in olive farming, Spain managed to double its olive oil production from 0.6 million tons in 1990 to 1.2 million tons in 2014 (accounting for half the increase in world production during this period).
- ✓ Italy and Greece both reduced their levels of output production during the past 5 years compared with the previous decade (declines of 17 per cent for Greece and 37

² We note that production levels refer to the year of sale (domestic or export) which is one year after the harvest (most of the quantities are harvested during the last months of each calendar year).



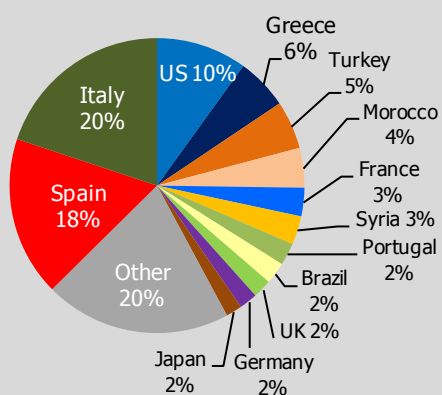
* weighted average of producer prices in Greece, Italy and Spain based on their contribution in total production

Source: Faostat, Eurostat, NBG estimates



Source: International Olive Oil Council

Consumption of olive oil 2014



Source: International Olive Oil Council

per cent for Italy). As a result, they both lost market share in world production (from 23 per cent to 14 per cent for Italy and from 14 per cent to 11 per cent for Greece).

- ✓ Other producers like Turkey, Tunisia, Morocco and Syria almost doubled their production during 1990-2014, increasing their market share in global production from 25 per cent to 35 per cent.

Apart from this long-term upward trend, global production presents significant volatilities per harvest season, mainly due to weather conditions. Indeed, global olive oil sales' volumes posted a significant decline in 2013 (28 per cent) due to a severe draught in Southern Spain in the previous year. Moreover, sales of Greek olive oil fell significantly below the 25-year average in 2014 (0.13 million tons compared with 0.35 million tons during 1990-2013) due to extreme weather conditions in Greece in the previous year. Looking forward, global olive oil sales in 2015 (based on the harvest of at the end of 2014) are expected to drop by about 25 per cent, driven by Spain and Italy, while Greek sales are expected to reach 0.3 million tons (i.e. about 7 per cent higher than the 5-year average).

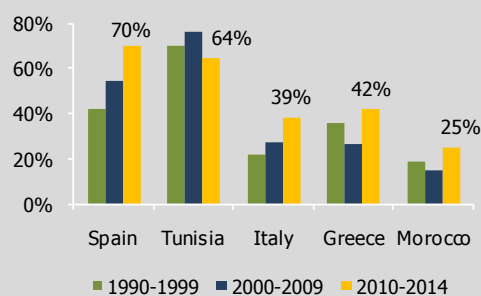
The increasing global olive oil supply (combined with the emergence of new lower-cost production methods as well as the increasing market power of food manufacturers and retailers) has put pressure on olive oil producer prices during the past 25 years. Specifically, the international producer price³ declined by about 1.5 per cent annually, in real terms, during 1990-2014. Nominal prices range between €2 per kg and €3.5 per kg, with prices affected by harvest volatilities (e.g. the price increase in 2013 due to the draught in Spain).

... with the increased quantity directed mainly to new markets ...

Olive oil production is, to a large extent, consumed in the main producing countries. Specifically, the three main producers absorb about 45 per cent of global consumption and have the highest olive oil consumption per capita (about 10-12 kg annually compared with 2.5 kg on average in other countries). In other

³ The international producer price is estimated as the weighted average of the prices in the top 3 producers based on their contribution in production.

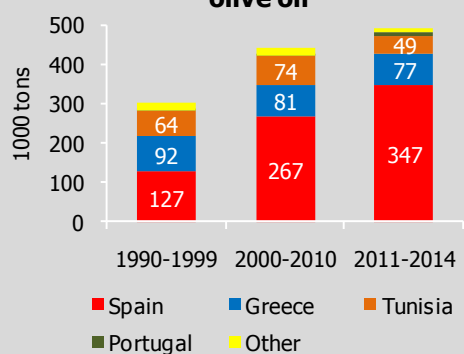
Exports / Production of Olive Oil



* For Italy the share of exports is calculated on the sum of production and imports (due to re-exports), otherwise it would reach 90 per cent of production during 2010-2014.

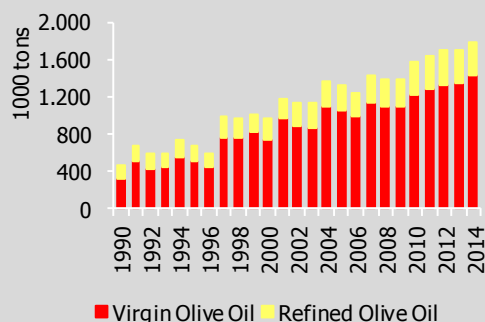
Source: Faostat, Eurostat, NBG estimates

Italian imports of virgin olive oil



Source: Eurostat, Comtrade, NBG estimates

World Exports



Source: Comtrade

countries, olive oil is substituted by vegetable oils such as soybean oil and sunflower oil, which have lower nutritional value but are available at less than a quarter of the price. The main consumer market outside the Mediterranean basin is the US, absorbing about 10 per cent of global consumption (which, however, is equivalent to significantly less than 1 kg per capita annually).

However, though consumption remains concentrated in the producing countries, new markets are emerging and are exhibiting strong demand. In fact, most of the growth in global olive oil consumption during 1990-2014 came from these countries, which more than doubled their consumption levels, as they gradually become more familiar with olive oil and its beneficial health qualities. As consumption in the largely saturated markets of the main producers remained relatively stable, their contribution to global consumption decreased from 70 per cent in 1990 to 45 per cent in 2014.

... partly using the Italian distribution channel

As the increased production was mainly directed to new markets, global exports of olive oil have more than doubled during the past 25 years from 0.7 million tons in 1990 to 1.8 million tons in 2014. Since the extra production largely originated in Spain, the export-orientation of the Spanish olive oil market has increased significantly – exporting 65 per cent of its production during the past 5 years versus 40 per cent of its production during the 1990s.

However, the increased Spanish production also benefited Italy. In fact, Italian olive oil manufacturing companies traditionally import bulk olive oil from different origins, qualities and specifications and then blend them to produce a branded product which is then re-exported to international markets for final consumption. These large multinationals have used this strategy to dominate the international market of branded olive oil by combining: i) large quantities (mainly originating in Spain); ii) fine quality (mainly from Greek and Italian olive oil); and iii) their extensive distribution networks and strong brand name.

Therefore, the above-mentioned global trade flows of 1.8 million tons in 2014 include double-counting of about 35 per cent of the exported volume in the form of bulk oil exports (mainly to Italy), which are subsequently re-exported to third party countries.

Virgin olive oil – Greece’s comparative advantage – is gaining market share

The higher world exports resulted largely as a consequence of the increased awareness regarding the nutritional value of olive oil. However, olive oil is not a homogeneous product. In fact, there are two main types:

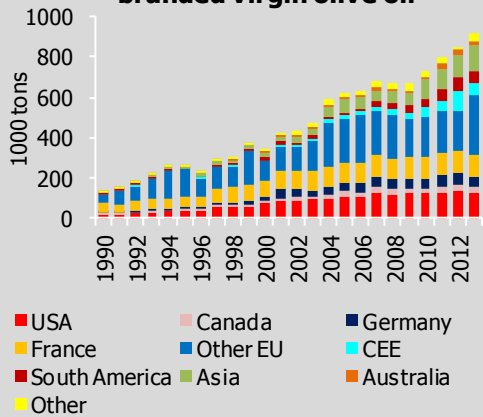
- ✓ Virgin olive oil is produced solely through mechanical processing (without any chemical treatment), allowing it to maintain its organic characteristics.
- ✓ Refined olive oil involves chemical processing of lower quality olives (or second pressing of olives) in order to be fit for consumption and to neutralize the bad taste resulting from oxidized olives, albeit losing many of its favorable properties in the process.

Higher global demand was mainly targeted for virgin olive oil (accounting for 80 per cent of global olive oil exports in 2014 compared with 70 per cent in 1990), which is the type of olive oil that Greece exports.

The international market for branded virgin olive oil is estimated at about 0.9 million tons. The main destinations of branded olive oil are the US, France and Germany, while other countries in CEE, Asia and South America have gradually increased their familiarity with olive oil. In particular, Russia, Brazil, Australia and Japan are high growth markets – with average annual growth rates of 120 per cent, 89 per cent, 21 per cent and 12 per cent, respectively, during the past two decades.

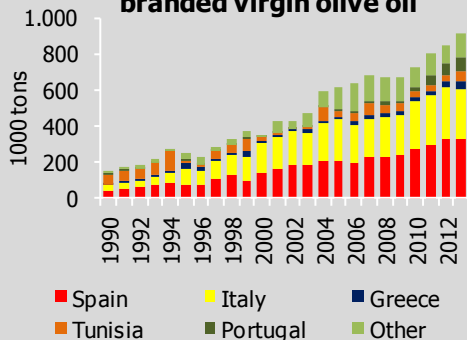
Most of the branded virgin olive oil trade flows originate from Spain and Italy, each having a relatively stable share of about 35 per cent in the international market during the past 20 years. Those two countries have divided between themselves a significant part of the main consumer markets, while Greece has a low 4 per cent in 2014, down from 6 per cent during the '90s. In fact, Italy mainly dominates the traditional markets (covering more than 2/3 of the markets in the US, Germany and Canada), while Spain has penetrated the new markets (covering around 2/3 of the markets in Japan, Russia, China and Australia). Moreover, it should be noted that other countries (i.e. not the top three producers) have managed to increase their cumulative share in the international virgin olive oil market from 9 per cent to 15 per

International imports of branded virgin olive oil



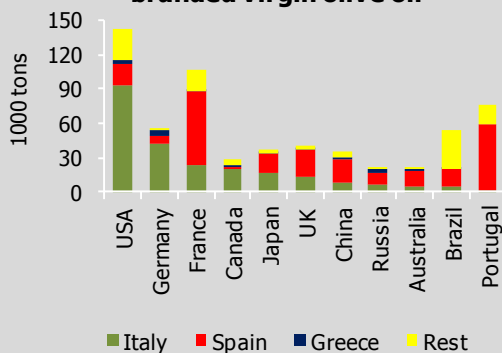
Source: Eurostat, Comtrade, NBG estimates

International exports of branded virgin olive oil



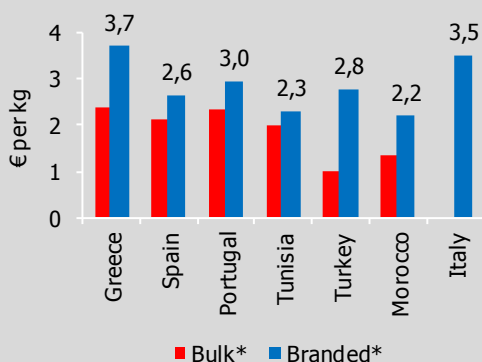
Source: Eurostat, Comtrade, NBG estimates

Basic import countries of branded virgin olive oil



Source: Comtrade (2013), NBG estimates

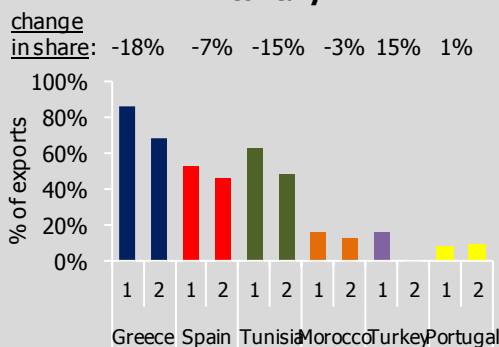
Export prices of virgin olive oil



* Bulk exports are estimated as exports to Italy (and Spain for Greece)
 ** Average prices 2010-2013

Source: Eurostat, Comtrade, NBG estimates

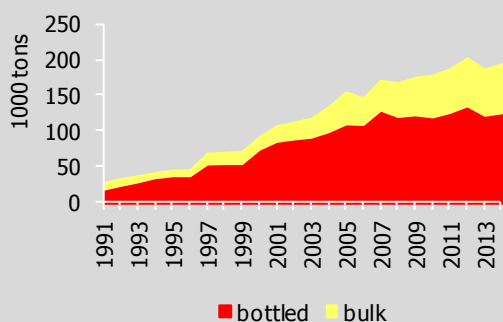
Exports of bulk olive oil to Italy



1: Period 1990-1999
 2: Period 2011-2014

Source: Eurostat, Comtrade, NBG estimates

US Market



Source: USITC

cent. Indicatively, about 15 per cent of the global increase in branded virgin olive oil trade comprises exports from Tunisia, Syria and Turkey to the US.

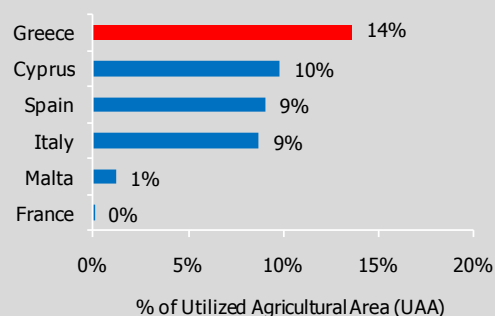
A closer look at the export prices of branded olive oil during the past 5 years for the three main producers and newer entrants to the market reveals differences in marketing strategies:

- ✓ Italy and Greece (to a lesser extent) aim for the premium segment of the international market, offering high quality olive oil at a price of over €3.5 per kg.
- ✓ Spain aims closer to the average consumer, with a moderate level of both quality and price (€2.6 per kg).
- ✓ Smaller producers like Turkey, Tunisia and Morocco (gradually penetrating consumer markets) usually target consumers seeking low prices instead of the high quality olive oil offered by Italy and Greece. As a result, their export prices are about 30 per cent lower than that of the three main producers.

As already mentioned, the other international market of olive oil is for bulk exports, which does not target final consumers but is directed to Italy in order to be re-exported. These are low value added exports, as is depicted in the lower export prices compared with branded olive oil. While all countries are becoming less dependent on Italian intermediaries to export their olive oil, Greece remains the most dependent (channeling 69 per cent of its exports to Italy during the past 5 years from 87 per cent in the 1990s). This is worrying, if we take into account the fact that Italy's bulk channel is being gradually dominated by Spain (86 per cent in 2014 from 38 per cent in 1994) – thus weakening the bargaining power of Greek producers.

Another alarming development is that as the market for olive oil matures, the bulk trade of virgin olive oil appears no longer limited to Italy. For example, American imports of bulk olive oil have been increasing during the past 2 decades. As a result, bulk virgin olive oil covered 35 per cent of total imports to the US in 2014, compared with 17 per cent in 1994.

Olive Plantations / Total Plantations



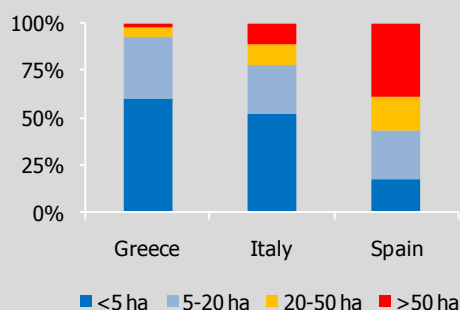
Source: Eurostat, NBG estimates

High olive yield regions

Region	Contribution to olive production	Yield (tons/ha)
Crete	30%	3,9
Peloponnese	39%	3,5
South Greece	69%	3,7
Greece total	100%	3,0
Andalusia	81%	3,3
South Spain	81%	3,3
Spain total	100%	2,5
Puglia	36%	3,3
Calabria	30%	5,5
South Italy	67%	4,0
Italy total	100%	2,9

Source: Eurostat

Structure of Olive Plantations



Source: Eurostat (2010), NBG estimates

2. GREEK OLIVE OIL VALUE CHAIN

Regarding structural characteristics of Greek olive oil production and distribution processes, we focus on:

- ✓ The cultivation of olives,
- ✓ The processing of olives for olive oil production, and
- ✓ The marketing and distribution of olive oil.

A. Cultivation of Olives

The climate in the south Mediterranean region is well suited for the cultivation of olives, which cover a greater share of agricultural land compared with other European regions. Greece has the largest share, with 14 per cent of agricultural land covered by olive groves, followed by Cyprus, Italy and Spain at about 10 per cent (compared with less than 1 per cent for other European countries). More than $\frac{2}{3}$ of olive production comes from the southern regions of the three main producer countries, which enjoy the highest productivity (about 30-40 per cent higher than each country's average).

Each of the three main producers enjoys different advantages regarding the cultivation of olives:

- Greece and Italy have similar landscapes and produce high quality olive oil...

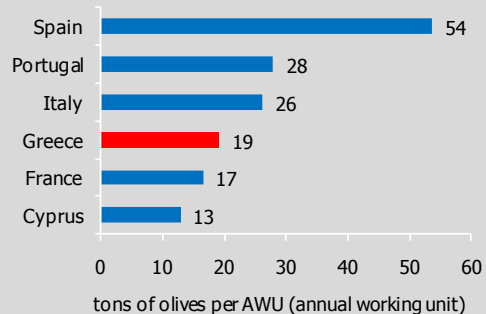
Greece and Italy achieve higher land productivity, reaching 3 tons of olives per hectare of cultivated land (compared with 2.5 tons in Spain). Moreover, the landscape structures (mountainous and semi-mountainous terrain) as well as the low levels of humidity are key factors leading to the superior quality of olive oil produced in Italy and Greece – characterized by low acidity and quality taste. Indicatively, extra virgin olive oil (which is considered the highest quality) covers about 80 per cent of production in Greece, compared with 65 per cent in Italy and 30 per cent in Spain.

- ...while the mechanization of production in Spain offers advantages in terms of cost

The smoother landscape in Spain is less beneficial in terms of organic and nutritional characteristics, but allows the mechanization of olive tree cultivation⁴, leading to lower

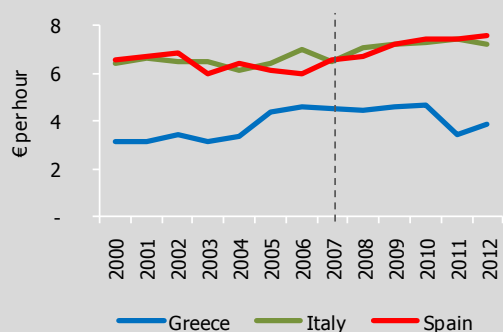
⁴ The main difference in the production process in Spain is that olive trees are planted in high density (about 200-400 short trees per hectare compared with 50-100 larger trees in Italy and Greece) and in a way that allows the

Labour Force Productivity



Source: Eurostat, NBG estimates

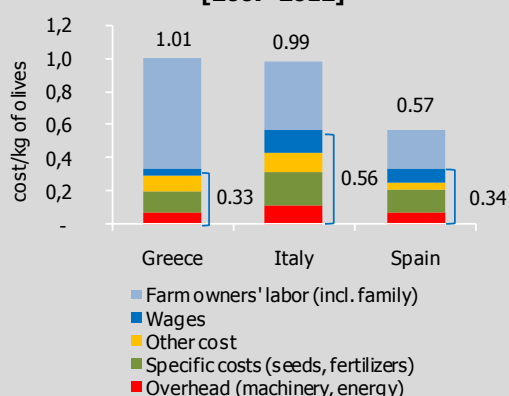
Olives real wage per hour



* Deflated values (2012 prices)

Source: FADN, Eurostat, NBG estimates

Olives production cost [2007-2012]



Source: FADN, Eurostat, NBG estimates

production costs. Combined with large holdings⁵, Spain has significantly higher labor productivity, reaching 45 tons of olives per employee compared with 26 tons in Italy and 19 tons in Greece. Moreover, the harvesting methods used in Spain lead to less damage to the olive crop (as opposed to beating or collecting the crop after it has fallen to the ground) as well as speedy delivery to the olive mills, with minimum loss in terms of quality.

Since olive farming is a labor intensive sector, the higher labor productivity offers Spain an advantage in terms of total production costs. Specifically, based on FADN survey data for olive farms⁶, about 60 per cent of production costs concerns wage payments (including family labor compensation⁷). We note that, to a large extent, Greece partly counterbalances low labor productivity with lower wages (about €4 per hour of paid labor compared with more than €7 per hour in Spain and Italy), resulting in lower average wage cost per kg (70 per cent lower than Italy but 55 per cent higher than Spain). In part, lower wage costs in Greece are linked to the fact that almost all seasonal workers in Greek agriculture are non-EU citizens (compared with about 5 per cent in Spain and Italy), who receive lower labor compensation.

Including other costs such as seeds, fertilizers, machinery and energy, Spain achieves the lowest total production costs of about €0.6 per kg of olives, compared with about €1 per kg in Greece and Italy. It should be noted that this level of costs includes the implied compensation of family labor (assumed to be equal to the average sectoral wage for paid labor). This is more common in Greece, covering about 90 per cent of working hours (and thus total wage costs), compared with 80 per cent in Italy and 70 per cent in Spain. Therefore, the actual cost paid by the farm owners (excluding unpaid labor) is similar in Greece and Spain – at about €0.33 per kg, compared with €0.56 per kg in Italy.

Regarding the production costs in real terms, we note that costs in

harvesting of olives through mechanical shakers, instead of the traditional ways of hand-picking or beating the fruit off with long poles into nets.

⁵ More than ½ of production in Spain comes from olive groves of more than 20 hectares, compared with 25 per cent in Italy and less than 10 per cent in Greece.

⁶ Olive farms in FADN (Farm Accountancy Data Network) database are classified as the farms with olive growing as their main activity. Therefore, as these farms could include other plantations up to a share of 25 per cent, there could be a small estimation bias in the results.

⁷ Compensation for unpaid family labor is proxied by the average wage in the EU olive farming sector.

Olives Net income

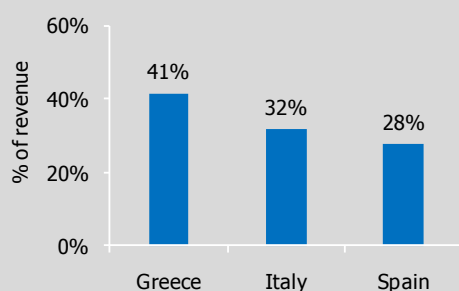
	Greece	Spain	Italy
Total revenue	0.82	0.58	0.94
<i>excl. subsidy</i>	0.48	0.42	0.64
<i>Subsidy</i>	0.34	0.16	0.30
Cost	0.33	0.34	0.56
Cost* (incl. family compensation)	1.01	0.57	0.99
Net Income	0.49	0.24	0.38
Net Income* (incl. family compensation)	-0.19	0.01	-0.05

Values in € per kg of olives (average 2007-2012)

* Cost and income are adjusted assuming family labor gets equal compensation per hour as the average worker in the EU olive farming sector.

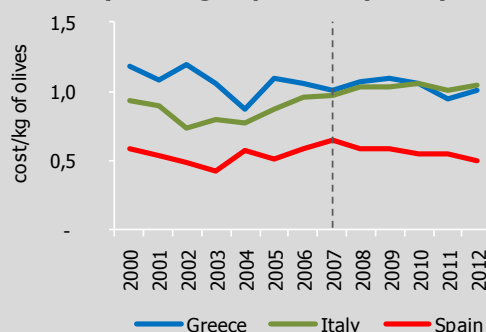
Source: FADN, Eurostat, NBG estimates

Contribution of subsidies in olive farming [2007-2012]



Source: FADN, Eurostat, NBG estimates

Olives real production cost* (including unpaid family labor)



* Deflated values (2012 prices)

Source: FADN, Eurostat, NBG estimates

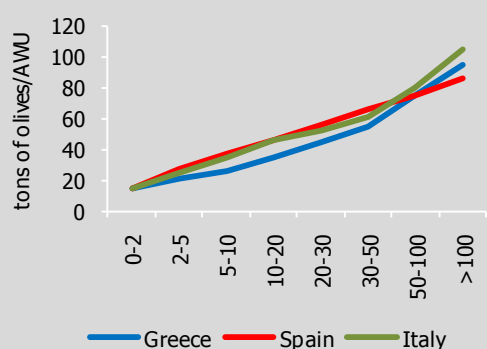
Greece and Spain have followed a slightly downward trend after 2007 (-10 per cent and -15 per cent, respectively). In Greece, the decrease was due both to lower real wages per hour (-15 per cent) and, to a lesser extent, higher labor productivity, while Spain posted the highest growth in labor productivity, of about 65 per cent (with relatively stable wages per hour). On the other hand, real production costs in Italy increased by about 10 per cent due to higher wages per hour (up 18 per cent), as well as a greater increase in other costs (mainly seeds and fertilizers).

Turning to olive farm revenue and profitability, Italy had the highest revenue during 2007-2012, at €0.94 per kg of olives, compared with €0.82 per kg in Greece and €0.58 per kg in Spain. A disaggregation of that revenue indicates that Italy has the highest selling price, excluding subsidies (€0.64 per kg compared with €0.48 in Greece and €0.42 in Spain)⁸ and Greece has the highest subsidy (€0.33 per kg compared with €0.3 in Italy and €0.16 in Spain). Considering the above-mentioned production costs per country, this leads to a profit of about €0.49 per kg in Greece, €0.38 in Italy, while Spain remains low at €0.24 per kg (including subsidies, but excluding the compensation of unpaid family labor).

At this point, it is important to underline that subsidies comprise a significant share of revenues (about 40 per cent in Greece, compared with approximately 30 per cent in Italy and Spain). Indeed, excluding subsidies (and family payments), profitability declines to €0.15 per kg in Greece, compared with €0.08 in Spain and Italy. The prospective reduction in the total level of CAP subsidies will pose significant challenges to the sector. Specifically, the recent CAP reform requires the convergence of income subsidies per hectare of agricultural land between regions, irrespective of the type of farming (as opposed to the current regime of individual support based on past production). Considering that olive farming had been among the high-subsidized sectors, the new CAP policy will have a large negative effect on the sector (see BOX 1). Subsidies in 2020 are expected to decline in Greece and Italy (about 30 per cent decrease compared with 2007-2012), which would (ceteris paribus) decrease profits to about €0.39 per kg and 0.3 per kg

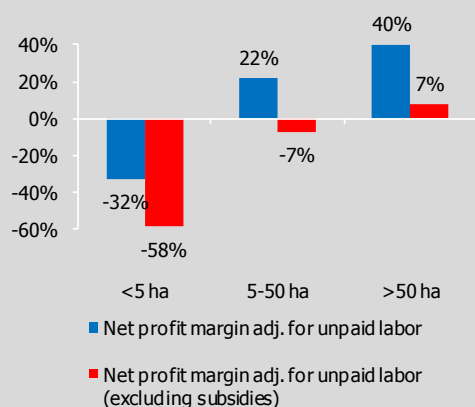
⁸ Based on the average extraction rate of 0.2 kg olive oil per 1 kg of olives, these estimated prices of olives are consistent with the producer prices of olive oil ranging between €2 and €3 per kg of olive oil (see page 3).

Labor productivity per farm size



Sources: Faostat, Eurostat, NBG estimates

Profit Margins* per farm size



* weighted avg 2007-2012 for Greece, Italy and Spain

Source: FADN, NBG estimates

respectively. On the other hand, olive oil subsidies in Spain are expected to remain relatively stable (with profits remaining about €0.24 per kg of olives), mainly because of relatively lower total CAP subsidies per hectare during 2007-2013.

It is important to note that the conclusions of the profitability analysis change significantly if unpaid family labor is taken into account. If family labor compensation was set equal to the average sectoral labor cost, Greece would end up with significant losses (about -€0.19 per kg) despite the existence of extensive subsidies, while Italy and Spain would be in a more balanced position (small loss -€0.05 per kg in Italy and marginal profit of €0.01 per kg in Spain, which benefits from its more mechanized approach).

Profitability is not uniform across all producers, since larger farms appear to have higher labor productivity (see graph) and consequently operate with higher profit margins. Specifically, based on farm data for Greece, Italy and Spain during 2007-2012:

- ✓ Small farms of less than 5 hectares (covering about 60 per cent of Greek olive plantations) operate with losses (even with the inclusion of subsidies, but adjusting for the cost of unpaid labor); suggesting that farm owners' compensation must be even lower than the average sectoral wage.
- ✓ Medium farms of 5-50 hectares achieve a profit margin of about 22 per cent (with the aid of subsidies) but have small losses without them.
- ✓ Larger farms of more than 50 hectares are more productive and achieve profits both with and without subsidies (profit margin of about 34 per cent and 6 per cent, respectively). This is mostly the case in Spain, covering about 40 per cent of olive plantations, compared with 10 per cent in Italy and only 2 per cent in Greece).

Consequently, the small and dispersed nature of Greek farms limits potential profits and increases dependence on subsidies and own labor to achieve a satisfactory compensation for the owner.

The Greek landscape may not facilitate more efficient farming as in Spain (even though there are some pilot intensive farms in the regions of Ilia and Lakonia).

B. Processing of Olives for Olive Oil Production

After the harvesting of olives, the next stage in the production process is the extraction of the olive oil, which takes place in olive oil mills. We will examine the characteristics and efficiency of this stage based on two significant parameters: i) the technology used; and ii) the organization and ownership status in the sector.

i) Greek olive oil mills are less technologically advanced ...

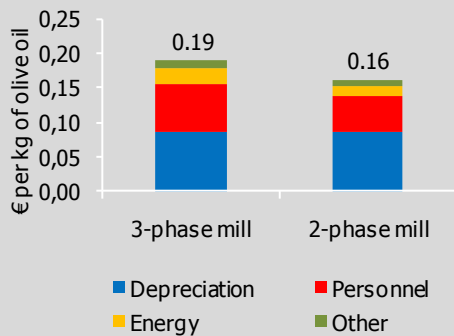
There are three main types of olive oil mills: a) traditional olive presses; b) three-phase centrifugal mills, where the extraction process produces olive oil, pomace and vegetation water; and c) two-phase centrifugal mills, which are the most advanced, producing olive oil and wet pomace. We note that pomace oil resulting from that process of olive oil extraction is usually used for industrial purposes only. However it can become suitable for food consumption after it has been refined.

Summarizing the main attributes of each technology:

- ✓ In traditional mills, pressure is applied to olive paste to separate the liquid oil and vegetation water from the solid material. This non-automatic process has a high risk of contamination and an increase in acidity – thus decreasing the quality of the extracted olive oil.
- ✓ Between the two types of centrifugal extraction, two-phase mills are both more productive (in terms of the amount of extracted olive oil) and more environmentally friendly. The main difference is that they require less water during the extraction process, leading to lower energy costs, less water waste during the process and a higher extraction rate of olive oil (output/input ratio). Overall, the average processing cost of two-phase mills is about €0.16 per kg of olive oil compared with €0.19 per kg of olive oil in three-phase mills. Moreover, the higher concentration of natural antioxidants enhances the quality of olive oil produced in two-phase mills and makes it more resilient during storage.

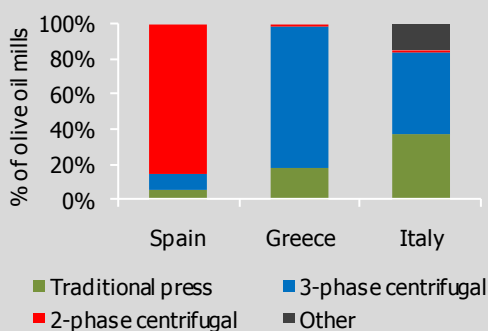
During the past 20 years, Spain has invested in the modernization of its olive oil mills, with the aid of European subsidies. Notably, two-phase mills cover about 87 per cent of the sector in Spain, compared with less than 2 per cent in Greece and Italy. Greek olive oil mills mostly use three-phase technology (80 per cent), while Italy uses both three-phase (47

Average processing cost by type of olive oil mill



Source: Chrysovalantou N., «Evaluation of 3-phase and 2-phase technology of olive oil extraction», National Technical University, 2010).

Olive oil mills technology



Source: ARE Liguria (Italy), Electronical Technical Transfer Olive Oil Network

per cent) and traditional mills (37 per cent). The promotion of two-phase mills is expected to continue, aiming for higher productivity combined with improved environmental protection.

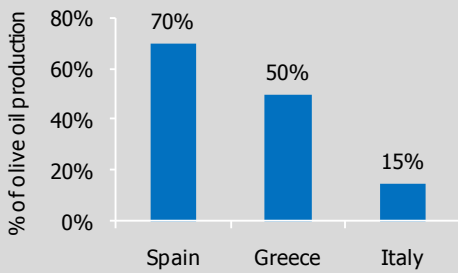
ii) ... and need better organization

In Greece and Spain, olive oil mills are, to a large extent, owned by cooperatives controlled by farm owners (covering 50 per cent and 70 per cent of olive oil production, respectively). This organizational structure allows small farm owners to benefit from economies of scale and increase their bargaining power against large manufacturing companies and retailers.

On the other hand, farm owners in Italy do not follow the same practice (cooperatives cover only 10 per cent of olive oil production). This is mainly due to the different promotion strategies of each country. Specifically, cooperatives often face problems regarding quality control and traceability due to the variety of producers (adverse selection, free-riding problems), hindering the promotion of premium products. For Italian olive oil producers, this is a very important factor, since they need to ensure the promotion of high quality – branded olive oil. To that end, it is common for small farm owners to own their private mill and bottling unit, allowing them to market their own branded product. On the other hand, Spain and Greece mainly market their olive oil in bulk form (both exports and domestic consumption – see below), which makes the need for traceability less important.

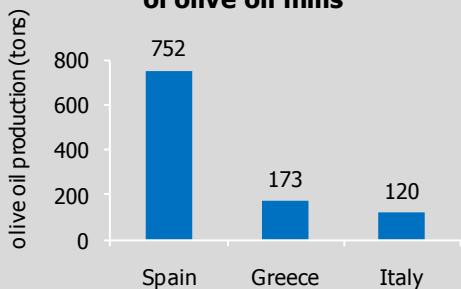
Despite their organization in cooperatives, Greek olive oil mills remain relatively small, with an average annual capacity of 170 tons of olive oil, compared with 120 tons in Italy and 750 tons in Spain. More importantly, their operation is often limited to the distribution of production subsidies to the farm owners and other administrative activities, instead of acting as an organized enterprise with a clear business strategy. In order to change the Greek model towards the promotion of high quality branded olive oil, the restructuring of the sector should be one of the main priorities, inter alia, to comprise more vertically integrated production, both upstream in the olive production stage, as well as downstream in the production of branded products. Moreover, Greek firms need larger economies of scale, irrespective of the degree of vertical integration.

Cooperative olive oil mills



Source: USITC (August 2013), IOC presentation (June 2010)

Average annual capacity of olive oil mills



Source: EDOEE, (Greece) MARM (Spain), ARE Liguria (Italy)

BOX 1: Common Agricultural Policy

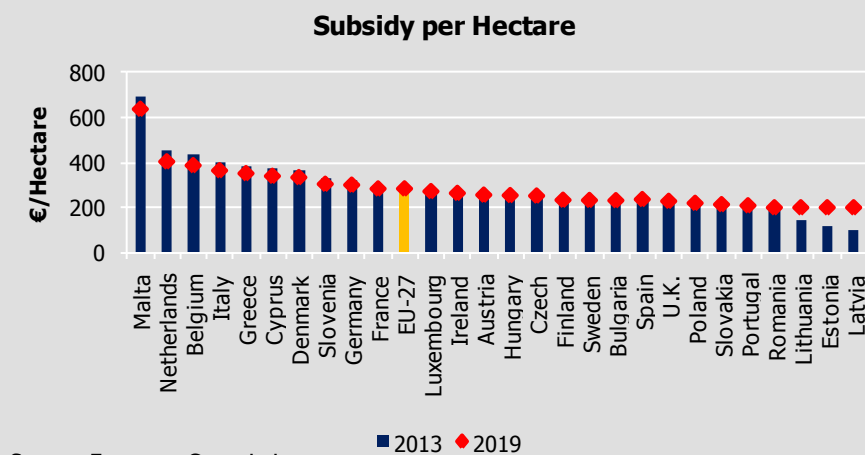
Since 1962, the European agricultural sector receives financial support through the Common Agricultural Policy (CAP). However, although the EU CAP budget has followed a downward trend, from 50 per cent of the EU budget in 2007 to 42 per cent in 2013 to an estimated 35 per cent in 2020, it is still the largest segment of the EU budget, absorbing about €55.5 billion annually during 2014-2020.

In particular, under the new program period of 2014-2020, there are two main pillars of funds:

- ✓ Pillar I mostly concerns direct payments to farm owners, as income support and to a smaller degree market intervention measures, such as export refunds and private storage aid, which mainly serve as a safety net tool when markets are unexpectedly destabilized (e.g. adverse weather conditions).
- ✓ Pillar II provides support for long term rural development, helping farm owners modernize their farms and become more competitive, while protecting the environment. These payments are part-financed by the member countries as a part of their respective multiannual financial frameworks.

Moreover, the new CAP program (2014-2020) promotes measures aiming mainly towards greener, more sustainable agriculture (through the concept of “cross-compliance”, and the introduction of the “Green Direct Payment”) and more efficient agricultural activity. The latter is pursued through: i) stricter regulations for the determination of active farm owners eligible for support; ii) administrative improvements; and iii) more flexibility for member states concerning the allocation of CAP funding between the two pillars and the allocation of direct payments to promote their individual agricultural strategy.

More importantly, the new CAP aims to the gradual convergence in the allocation of direct payments per hectare among member states (external convergence) in order to diminish several disparities brought about by: i) historic allocation systems; and ii) the introduction of new member states in the EU. Specifically, the target is to close 1/3 of the gap between the current level of subsidy in each member state and 90 per cent of the EU average by 2020. As Greece is one of the member states with a high direct subsidy per cultivated land (€384/ha in 2013 vs an EU average of €293/ha), its share in the EU CAP budget is expected to fall to 3.5 per cent in 2019 from 5.6 per cent in 2007 (approximately €2 billion annually for the period 2014-2020 compared with about €2.5 billion during 2007-2013).



Implementation of CAP reforms in Greece

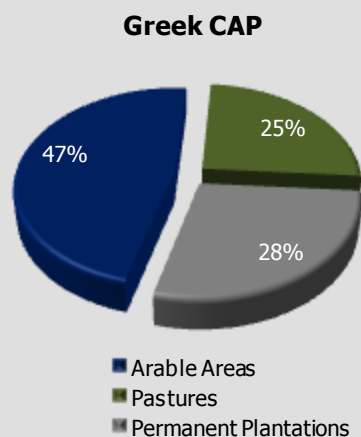
Against the background of the main principles of the new CAP, Greece has allocated its available funds to the two Pillars (77 per cent in Pillar I and 23 per cent in Pillar II) by setting guidelines regarding the allocation of Pillar I funds:

- ✓ All types of farm owners are eligible for 85 per cent of annual payments, based on the following allocation scheme:
 - a. arable land (absorbing 47 per cent of funds - €420/ha),
 - b. permanent crops (absorbing 28 per cent - €500/ha) and
 - c. pastures (absorbing 25 per cent - €250/ha).

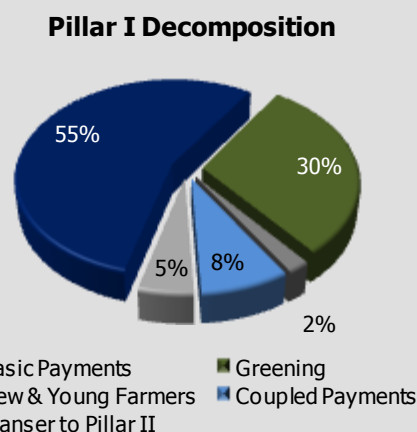
Note that these funds include two distinct categories: i) the Basic Payment (55 per cent of annual payments); and ii) the Green Direct Payment (30 per cent of annual payments) which is accompanied by environmental criteria.

- ✓ Farm owners of specific products (e.g. legumes, forage, sugar beet, hard wheat, bovine animals, goats, rice, industrial tomato, seeds, oranges for juice and asparagus) will also receive extra subsidies. These coupled payments will absorb 8 per cent of direct payments.
- ✓ Farm owners in areas with natural constraints (e.g. mountainous areas) will absorb 5 per cent of direct payments (transferred to pillar II).
- ✓ Young farm owners (less than 40 years old) will absorb the remaining 2 per cent of direct payments (as an incentive to join the sector and modernize the production process).

At this point, it is important to note that, in an effort to moderate the convergence process, there is a provision for a maximum drop of 30 per cent for each farm owner per hectare during 2015-2019.



Source: OPEKEPE



Source: OPEKEPE

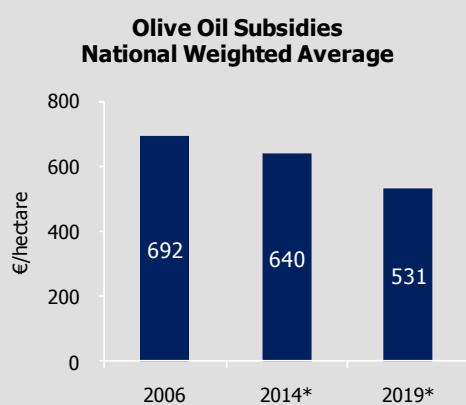
Implications for the olive sector

While Greek olive producers will benefit from the fact that they will be allowed to receive the full amount of the Green Direct Payment without the obligation to meet environmental requirements, their subsidies will suffer through:

- ✓ the reduction of the total CAP budget for Greece (about 17 per cent lower in 2019 than in 2013), and
- ✓ the reduction of the share of the budget that they will receive (approximately 18 per cent in 2019 from 21 per cent in 2006).

Combining the above-mentioned effects, olive farm owners will receive about €390 million annually during 2015-2020 from €455 million in 2014. Therefore, the annual subsidy for olive farm owners will be around €530/ha in 2019 (versus €640/ha in 2014) leading to a subsidy of about €1.35/kg of olive oil in 2019 (versus €1.55/kg in 2014)⁹.

Finally, we note that the size of the reduction will not be uniform across all farm owners. Due to the objective to eliminate the inequalities between farm owners, well-paid olive farm owners of southern Greece will suffer a greater reduction to their subsidies (which, however, have a ceiling of 30 per cent during 2015-2019).



Source: OPEKEPE, NBG estimates
* NBG estimates

Olive Oil Subsidies (€/hectare)		
	2006	2014*
Crete	1,554	1,065
Ionia Islands	971	776
Attiki	298	756
Western Greece	467	558
Peloponnese	515	548
Northern Aegean	310	440
Stereia Ellada	289	400
Eastern Macedonia & Thraki	560	387
Central Macedonia	657	378
Epirus	236	336
Thessaly	262	317
Southern Aegean	354	276
Western Macedonia	225	132
<i>Weighted National Average</i>	692	640

* NBG estimates

Source: OPEKEPE, NBG estimates

⁹ Note that the reduction in terms of subsidy/kg is lower than the reduction in terms of subsidy/ha due to an expected decline in production volume.

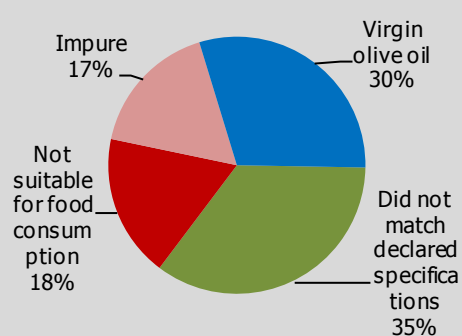
Main olive oil producers

	Spain	Italy	Greece
Available supply			
Production	1.45	0.42	0.31
Imports	-	0.54	-
Total	1.45	0.96	0.31
Consumption			
1. Domestic consumption			
<i>branded</i>	0.32	0.41	0.05
<i>bulk</i>	0.24	0.19	0.13
<i>bulk - non food</i>	0.07	0.01	0.02
2. Exports			
<i>branded</i>	0.41	0.35	0.03
<i>bulk</i>	0.41	-	0.08

* in million tons (average data for 2010-2012 due to high volatility)

Source: IOOC, Faostat, Comtrade, NBG estimates

Quality of bulk olive oil



Source: "An examination of samples", Laboratory of Chemistry and Food Technology, Aristotele University Thessaloniki, 2003.

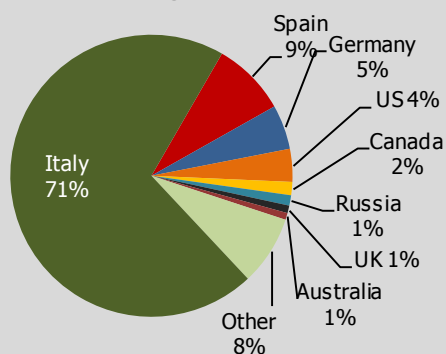
C. Marketing and Distribution of Olive Oil

After extraction in the olive mills, olive oil is distributed for domestic consumption or exports. We note that only 27 per cent of Greek olive oil production is distributed as a branded product (compared with 50 per cent of production in Spain and about 80 per cent in Italy), while most of it is sold in bulk form. Bulk olive oil distribution is a common practice in Greece for both exports and domestic consumption. Specifically:

- ✓ Domestic consumption absorbs about 2/3 of olive oil production in Greece, of which 75 per cent is in bulk form (compared with 50 per cent of domestic consumption in Spain and only 32 per cent in Italy). The limited branding in the Greek market is correlated to the high degree of self-consumption, as Greek producers (who are small and dispersed) keep a significant part of their production for their relatives and friends, whereas in Italy and Spain distribution follows more official channels. We note that even though bulk sales, by definition, cannot be accompanied by product quality guarantee, consumer surveys show that bulk olive oil is considered of higher quality (more pure) and, in most cases, is preferred by Greek consumers, despite a price similar to that of branded olive oil. However, scientific surveys suggest the contrary. An examination of samples of bulk olive oil by the Laboratory of Chemistry and Food Technology of the Aristotle University in Thessaloniki (2003) showed that only 30 per cent was confirmed as virgin olive oil, while 35 per cent did not fit the declared specifications, 18 per cent was found unfit for consumption and 17 per cent was impure.
- ✓ Exports absorb the remaining 35 per cent of Greek production (compared with 36 per cent in Italy and 57 per cent in Spain). Due to the lack of an effective export strategy and the relevant sector organization, most of the exported quantity (about 70 per cent) is directed to Italy in bulk form, where it is mixed with olive oil of different origins and then re-exported as branded Italian olive oil (as mentioned above). This leads to two negative effects for Greek olive oil: i) loss of value added from branding and ii) low familiarity of foreign consumers with the taste of Greek virgin olive oil (which is more intense than refined oils and

blends).

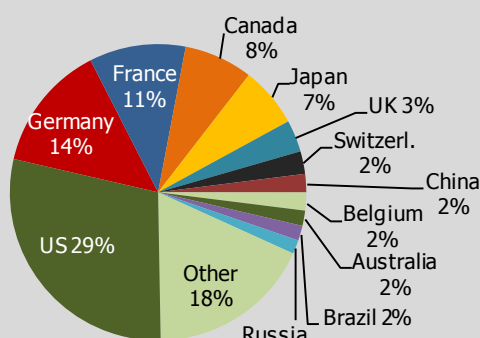
Greece: destination of exports of virgin olive oil



* export partners of 2013 (2014 was less representative due to low level of exports)

Source: Eurostat, USITC

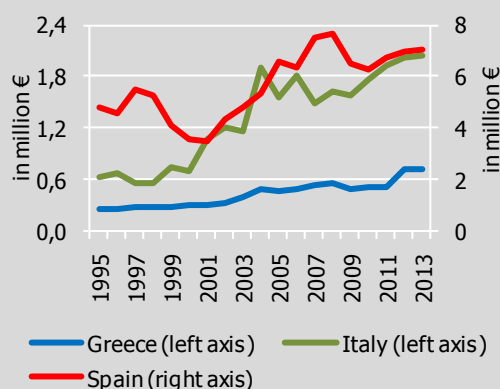
Italy: destination of exports of virgin olive oil



* export partners 2014

Source: Eurostat, USITC

Average annual turnover of branded olive oil companies



Source: Eurostat, NBG estimates

Focusing on the manufacturing stage of the value chain, there are about 460 companies producing branded olive oil in Greece¹⁰. Contrary to the farming stage, the sector of branded olive oil is highly concentrated and mainly targets the domestic market. Specifically, consumption in Greece is dominated by two companies, covering more than 1/2 of branded olive oil sales, while another 20 per cent concerns private label products marketed by large retailers. The export oriented segment of the Greek market is less concentrated, with four companies covering 40 per cent of Greek branded olive oil exports and the rest concerning mainly cooperatives.

Compared with their competitors in Italy and Spain, Greek enterprises are relatively small and compete at a disadvantage, as they lack economies of scale and access to international distribution networks. Specifically, the average annual sales of Greek companies are about €0.7 million, compared with €2 million in Italy and a significantly higher €7 million in Spain. We note that the expansionary strategy of food manufacturers in Italy and Spain during the past decade has led to the creation of powerful groups with international presence. Indicatively, four groups based in Spain (controlling most of the top Italian brands) cover about 1/2 of global sales of branded olive oil.

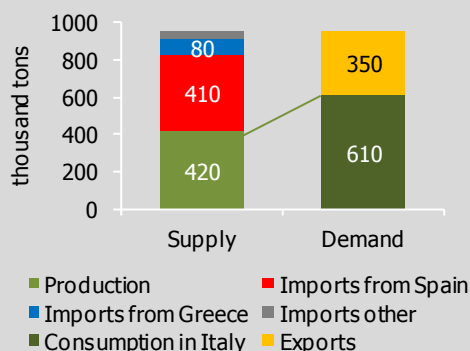
In this competitive environment, there have been a considerable number of small Greek brands which manage to reach international markets. However, they only manage to maintain their international presence for about one year on average¹¹. The small volume and short duration of those brands in international markets, leads to low awareness of Greek branded olive oil among foreign consumers.

The challenges become even greater considering the fact that the distribution networks for branded olive oil are mostly controlled by large retailers (supermarkets). A common strategy of those retailers is to buy large quantities of branded olive oil at very low prices that allow for promotion strategies, often acting as a loss

¹⁰ Companies that are licensed by the Ministry of Agriculture to market olive oil labeled as "Greek product".

¹¹ Data based on a survey by DK Consultants (2014)

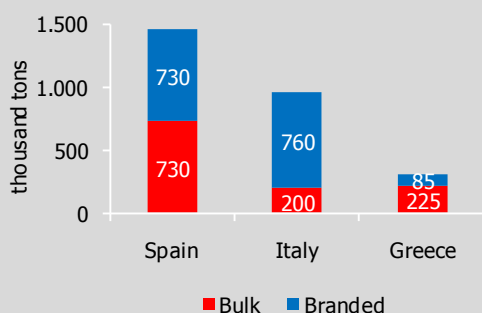
Italian olive oil (supply vs. demand)



* Average data for 2010-2012 due to high volatility

Source: IOOC, Comtrade, NBG estimates

Consumption* of olive oil in branded or bulk form



* Including domestic consumption and exports.

* Average data for 2010-2012 due to high volatility

Source: Eurostat, Faostat, NBG estimates

leader product (sold below cost to attract customers – while the retailer makes profit through the sales of other products). Manufacturers in Italy and Spain are better suited to operate in such conditions as:

- ✓ They export large volumes of branded olive oil (in Spain by exploiting their large production volumes and in Italy by mixing it with imported quantities from other countries).
- ✓ Additionally, Italy has the advantage of recognizable brands with strong presence in international markets, while Spain relies on cost advantages in the initial stages of production (olive farming and processing by olive oil mills) allowing more competitive prices and access to markets where Italian olive oil (of higher quality) is considered too expensive.

Summing up

Taking into account all the stages of olive oil production and distribution, the main characteristics of the three competitors are:

- ✓ Spain is the most competitive in terms of cost, benefiting from the mechanization of production as well as modernization in the processing stage. Combined with the large volumes of production and the expansionary strategies of manufacturing companies, it has gained access to international markets with olive oil of average quality.
- ✓ Italian producers have overcome the obstacle of high production costs (high wages and low labor productivity) by developing international brands and networks, allowing them to sell at higher prices. The combination of large volumes and high quality is achieved through imports of bulk olive oil of several qualities, which is mixed to get the final product, promoted as high quality Italian olive oil. It should be noted that without the imports from Spain and Greece, Italian production would not be sufficient to cover even the Italian domestic consumption. Nevertheless, Italy is, along with Spain, the world's largest exporter of branded olive oil.
- ✓ Greek olive oil is considered of the finest quality, but its potential is limited by: i) small and dispersed farms (negatively affecting production costs); ii) lack of operational organization and less advanced technology in the processing stage; and iii) small share of branded olive oil in the domestic market as well as in the export market, affecting the competitiveness and bargaining power of manufacturing companies.

Against this background, a conversion to the Italian model through a focus on differentiation and quality promotion is a plausible strategy that would increase productivity and profits. The certification of Greek olive oil as a high quality product would facilitate that strategy, considering the small size of Greek producers and their difficulty in promoting their products independently. Currently, there are 29 labels of olive oil certified as PDO (protected designation of origin) and PGI (protected geographical indication) schemes, covering only 3 per cent of Greek production. These categories could be broadened so as to include wider regions (thus a higher share of production), especially concerning PGI products where the rules are less strict. More importantly there needs to be a coherent marketing strategy, to educate consumers about Greek virgin olive oil. This effort could comprise (i) organized campaigns by the State and/or sector organizations to promote the Greek brand in international markets and (ii) the cooperation between companies to create international networks.

BOX 2: BRANDED OLIVE OIL COMPANIES

The world market of branded olive oil is dominated by large multinational enterprises. In particular, the Spanish company Deoleo, through a series of brands acquisitions (such as with the Italian Bertolli, Caparelli, Sasso and the Spanish Carbonell and Koipe), currently covers about 22 per cent of the world market (around 0.4 million tons).

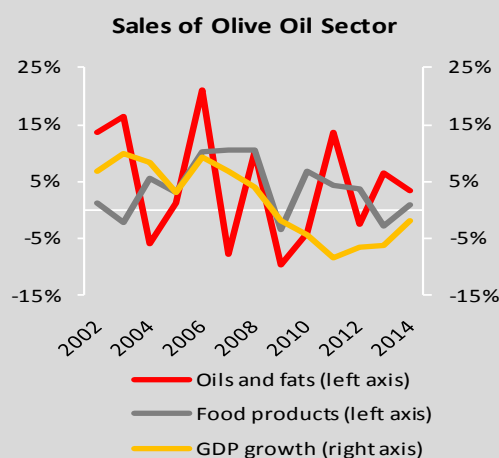
Turning to Greece, two companies (Elais-Unilever and Minerva) cover almost 60 per cent of the domestic market of branded olive oil (estimated at around 35-40 thousand tons). Other manufacturing companies and producers' associations cover another 20 per cent, while the rest is captured by private label brands of super markets. As far as Greek exports are concerned (controlling just 3 per cent of the international market), they are mainly undertaken by four companies (Nutria, Gaea, Elais-Unilever and Minerva) – with producers' associations having a limited participation in the foreign markets.

Greek companies of branded olive oil

The olive oil companies have proven resilient during the recent economic downturn, as their turnover increased, with an annual average growth rate of about 3 per cent during 2009-2013 (compared with an annual average decline of 5 per cent for nominal GDP during the same period).

Moreover, it is noteworthy that during this difficult period they managed to maintain their profitability almost intact (with an EBITDA margin of 7 per cent in 2009-2013 versus 8 per cent in 2005-2008).

In fact, the olive oil companies can be considered as one of the healthier industries of the generally resistant food sector. Specifically, their lower leverage (with an debt to equity index around 1.3 versus 1.6 for the food industry) combined with a strong operational efficiency (as captured by an asset turnover ratio of 1.0 versus 0.8 for the food industry) limit their debt-to-EBITDA ratio to 4.9 during 2009-



Greek Olive Oil Companies

	2005-2008	2009-2013
ROA	4%	1%
ROE	10%	3%
EBITDA margin	8%	7%
Net Profit margin	3%	1%
Asset Turnover	1.27	0.99
Debt/EBITDA	2.9	4.9
Debt/Equity	1.3	1.3
Interest Coverage Ratio	4.1	2.1
Operating Cycle	130	146
<i>Days Payable Outstanding</i>	58	76
<i>Days Receivables Outstanding</i>	74	80
<i>Days Stock Outstanding</i>	113	142
% Growth in Sales	6%	3%

Source: ICAP, NBG estimates

Greek Food Companies

	2005-2008	2009-2013
ROA	3%	1%
ROE	7%	1%
EBITDA margin	11%	7%
Net Profit margin	3%	1%
Asset Turnover	0.87	0.84
Debt/EBITDA	4.0	6.7
Debt/Equity	1.5	1.6
Interest Coverage Ratio	3.0	1.3
Operating Cycle	142	133
<i>Days Payable Outstanding</i>	88	102
<i>Days Receivables Outstanding</i>	92	87
<i>Days Stock Outstanding</i>	138	148
% Growth in Sales	9%	2%

Source: ICAP, NBG estimates

2013 compared with 6.7 for the food sector on average.

This general outlook for the sector actually masks the significant deviations between firms of different sizes. In particular, small companies (with sales of less than €1 million) have shrunk by 40 per cent during 2009-2013. The fall in their asset turnover ratio (0.47 from 0.74 during 2005-2008) has led to net losses and a significant increase in their debt-to-EBITDA ratio (8.4 during 2009-2013 versus 5.6 during 2005-2008).

On the other hand, the large companies of the sector (with sales over €10 million) have had an exceptional performance compared not only to their smaller Greek competitors but also to their listed EU peers. Greek firms' high asset turnover ratio (1.3 versus 0.5 of EU companies) counterbalances their lower operational profitability (5 per cent versus 19 per cent for EU companies), thus leading to a similar ROA to the EU average. This is in fact noteworthy, as the EU listed companies are more than 10 times bigger in terms of sales compared with the large Greek companies.

Vegetable Oil Companies (2009-2013)

	Greece			EU
	Small*	Medium*	Large*	
ROA	-3%	-0.5%	2%	3%
ROE	-7%	-1%	4%	7%
EBITDA margin	8%	8%	5%	19%
Net Profit margin	-7%	-1%	1%	7%
Asset Turnover	0.47	0.66	1.28	0.47
Debt/EBITDA	8.4	5.5	4.0	3.5
Debt/Equity	1.3	1.0	1.2	0.8
Interest Coverage Ratio	-0.6	1.1	2.7	5.2
Operating Cycle	170	165	115	130
<i>Days Payable Outstanding</i>	150	69	72	40
<i>Days Receivables Outstanding</i>	101	99	72	93
<i>Days Stock Outstanding</i>	219	136	114	77
% Growth in Sales	-10%	11%	1%	-1%

**Small are companies with sales up to €1 million, Medium are companies with sales €1-10 million, Large are companies with sales more than €10 million.*

Source: Facset & ICAP, NBG estimates

Vegetable Oil Companies (2005-2008)

	Greece			EU
	Small*	Medium*	Large*	
ROA	-1%	2%	4%	3%
ROE	-2%	5%	10%	7%
EBITDA margin	8%	8%	7%	12%
Net Profit margin	-1%	2%	3%	5%
Asset Turnover	0.74	1.06	1.42	0.64
Debt/EBITDA	5.6	3.2	3.0	4.9
Debt/Equity	1.5	1.1	1.4	1.1
Interest Coverage Ratio	0.8	3.2	3.8	3.5
Operating Cycle	107	109	130	113
<i>Days Payable Outstanding</i>	125	72	54	36
<i>Days Receivables Outstanding</i>	89	77	76	96
<i>Days Stock Outstanding</i>	143	104	108	53
% Growth in Sales	1%	3%	7%	10%

**Small are companies with sales up to 1 million €, Medium are companies with sales 1-10 million €, Large are companies with sales more than 10 million €.*

Source: Facset & ICAP, NBG estimates

3. NBG MODEL FOR INTERNATIONAL OLIVE OIL MARKET

With a view to estimating the potential of the olive oil sector, we constructed models for the determination of world demand, supply and international prices of olive oil.

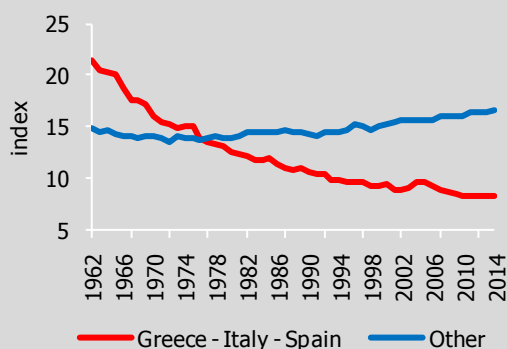
World demand for olive oil appears to be driven by: i) household income (proxied by GDP per capita); ii) relative prices of olive oil compared with other vegetable oils; and iii) the preference towards Mediterranean diet. The measurement of the preference towards Mediterranean diet was undertaken through the construction of an index based on the consumption of products that are promoted through this specific diet (i.e. cereals, fruit, vegetables, dairy and olive oil in the nominator) as opposed to the consumption of products that should be avoided (i.e. red meat). We note that the Mediterranean diet index has a downward trend in the top three olive oil producing countries, but is increasing in the rest of the world.

We constructed two different demand models – one for the top three olive oil producing countries and one for the rest of the world (from now on “other markets”). Specifically:

- ✓ Based on the income elasticity of demand (0.75 for the top three producers compared with 2.02 for other producers), the top three producers consider olive oil a basic product (in the stage of saturation) as opposed to other markets where it is considered a premium product (income elasticity of demand greater than 1).
- ✓ Prices of olive oil relative to that of other oils have a greater impact on the demand of other markets (with a negative elasticity of 0.13 compared with 0.06 in the top three producers).
- ✓ The increased preference for the Mediterranean diet appears to be the main driver behind the increasing demand for olive oil in other markets (with an elasticity of 1.19 compared with 0.25 in the top three producers).

World supply of olive oil is mainly determined by: i) production costs; and ii) CAP subsidies. The growth in production was, to a large extent, a result of increased cost competitiveness, primarily

Mediterranean diet*



*The index consists of the consumption of Mediterranean products (cereal, fruit, vegetables, dairy and olive oil) relative to the consumption of red meat (which is to be avoided based on the Mediterranean diet).

Source: Faostat, NBG estimates

International Olive Oil Market: Model Basic Equations

Elasticities t-statistics

Demand of 3 countries ($R^2=0,89$)

GDP	0.75	6.51
Relative price	-0.06	2.09
Mediterranean diet	0.25	2.37

Demand of rest countries ($R^2=0,97$)

GDP	2.02	7.63
Relative price	-0.13	2.88
Mediterranean diet	1.19	2.61

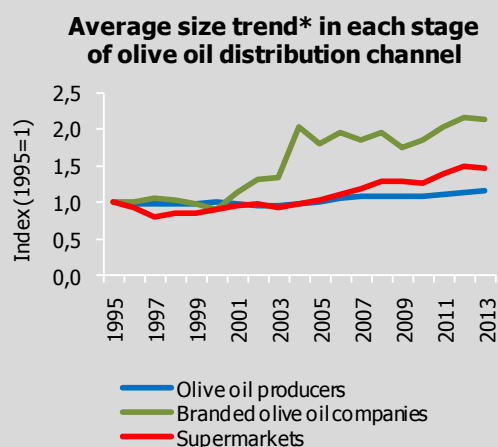
Production of 3 countries ($R^2=0,87$)

Cost	-0.17	2.36
CAP	0.22	2.83

Prices ($R^2=0,89$)

Production	-0.48	4.54
Relative bargaining power	0.4	4.43

Source: NBG estimates



* Weighted average annual sales of companies in Greece, Italy and Spain (EU27 average for supermarkets).

Source: Eurostat, NBG estimates

International Olive Oil Market: Assumptions

	2000-2009	2010-2014	2015-2020
GDP - top 3	0.5%	-0.8%	1.5%
GDP - other	1.1%	1.9%	2,0%
Relative prices - top 3	-1,0%	-0.9%	1.3%
Relative prices - other	-2.6%	4,0%	1.3%
Mediterr. diet - top 3	-0.7%	-0.8%	-0.4%
Mediterr. diet - other	0.6%	0.8%	0.5%
CAP (real)	-0.9%	-2.2%	-2.8%
Production cost	2,0%	0.2%	-0.5%
Relative bargaining power	-7.3%	-5.7%	-1.5%

* average annual growth rates

Source: Eurostat, Faostat, OECD, NBG estimates

in Spain. Specifically, according to our estimates, a 10 per cent decrease in production costs leads to a 1.7 per cent increase in production, while a 10 per cent increase in CAP funding (in real terms) leads to a 2.2 per cent increase in production.

International prices of olive oil¹² are determined by: i) the relative supply and demand conditions; and ii) the relative bargaining power of producers against manufacturers and traders of olive oil. As world demand is more stable, prices are actually driven by supply changes and, more specifically, the supply by the top three producers. The rationale is that the top three producers have sufficient marketing and branding power to control the market as well as their stock levels (using the private storage aid provided by CAP). The relative bargaining power is modeled by the relative size of the agents (average sales of olive farm owners and olive oil mills versus branding companies and supermarkets). According to our estimates, a change in olive oil production volume by 10 per cent brings an opposite effect of 4.5 per cent in the international price of olive oil). Similarly, the continuous concentration in the sectors of branding and retail trade, combined with the dispersed nature of the agricultural sector, puts pressure on olive oil prices, with an elasticity of 0.4.

Despite the increased production, strong demand is expected to drive up olive oil prices

Regarding the main drivers of the olive oil market, we assume that:

- ✓ European subsidies for olive oil will continue to decline by about 3 per cent annually (in real terms) during 2013-2020, reflecting the most recent budget allocation of the CAP.
- ✓ The high unemployment in southern Europe is expected to keep wage costs contained.
- ✓ Real GDP per capita is expected to post an average annual growth of 1.5 per cent in the top three producing countries and about 2 per cent in other markets during 2015-2020.
- ✓ As the awareness of the health benefits of the Mediterranean diet increases, global food consumption of the relevant products is expected to increase (less so in the top three producers where the market appears to be saturated).
- ✓ Under the pressure of the CAP reform restrictions, producers

¹² International prices of olive oil are calculated as the weighted average of the producer prices of the top three producers.

International Olive Oil Market: Estimates for basic variables

	2012-15	2020
DEMAND*	3.0	3.4
3 countries	1.3	1.4
other countries	1.7	2.0
SUPPLY*	2.8	3.3
3 countries	1.9	2.1
other countries	0.9	1.2
PRICES**	2.5	2.7

*in million tons

**Producer price: €/kg of olive oil

Source: Eurostat, Faostat, NBG estimates

Greek Olive Oil: Assumptions and Estimates

Assumptions

	2012-15	2020
Relative cost	0.8	0.8
Relative subsidy	20%	18%

Estimates

	2012-15	2020
Greek share (% top 3)	16%	13%
Production (tons)	310.000	280.000

Equation ($R^2=0,88$)

Elasticities t-statistics

Relative cost	-0.54	2.48
Relative subsidy	1.23	4.71

* average 2013-2015 due to volatilities

Source: Eurostat, Faostat, NBG estimates

are expected to gradually increase their size and thus close their gap with the following stages of the supply chain.

Against this background, we expect:

- **Demand** for olive oil is expected to grow at an annual rate of 2.7 per cent during 2015-2020, with most of the increase coming from markets other than the top three producers (1.5 per cent for the top three producers and 3.5 per cent for the other markets).
- Reflecting lower CAP support, **olive oil production** in the top three producers is estimated to reach 2.1 million tons in 2020 (compared with 1.9 million tons during the past 4 years, which however was significantly below their capacity level due to extreme weather conditions). With other producers continuing to increase their production (following the 10-year average increase of 5 per cent p.a.), total olive oil production is expected to reach 3.3 million tons in 2020 (compared with 2.8 million tons in 2014).
- Despite the higher production (mostly by other producers), **prices** for olive oil are expected to slightly increase to €2.7/kg in 2020 from €2.5/kg in 2014, as (i) demand will grow faster than the supply of the top three producers, (ii) the level of subsidies will drop and (iii) the concentration in the sectors of branding and retail trade seems to have run its course.

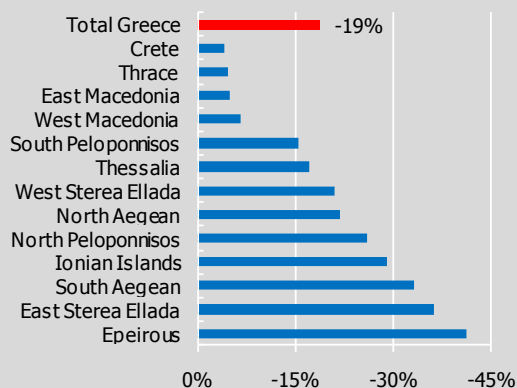
4. GREEK OLIVE OIL MARKET: LOOKING FORWARD

In the short run, Greece is expected to continue losing market share in volume terms

The Greek share in olive oil production of the top three producers has been following a downward trend for over a decade, from 25 per cent in 1995 to 21 per cent in 2000 and 16 per cent, on average, during 2013-2015¹³. The analysis indicates that the Greek share is mainly determined by the relative position of Greek producers compared with their main competitors in Spain and Italy as regards: i) production costs; and ii) CAP funding for olive oil. Specifically, an increase in the relative production cost in Greece by 10 per cent causes a drop in the Greek market share by 5.4 per cent, while an equal increase in the relative CAP funding increases the Greek market share by 12 per cent.

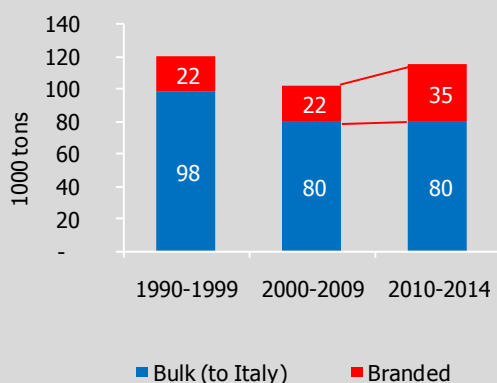
¹³ We apply a period average as this was a time of extreme production volatility.

Reduction of Olive Oil Plantations (2006-2014)



Source: OPEKEPE. NBG estimates

Greek exports of olive oil



Source: Eurostat, Comtrade, NBG

Considering the changes between 2007-2013 and 2014-2020 in both the level of total CAP budget for each country and the announced methods of internal convergence of subsidies per hectare of land (see BOX 1 for CAP reform), we estimate that olive oil subsidies will decrease in real terms by about 29 per cent in Greece compared with 20 per cent in total for the top three producers between 2013 and 2020. As a result, Greece's market share in the three main producers' production is expected to continue its downward trend, falling to 13 per cent in 2020 compared with 16 per cent on average during 2013-2015 (i.e. from 11 per cent to 8.5 per cent of global production).

In the long run, Greece's potential can increase significantly if it switches to the production of higher value-added products...

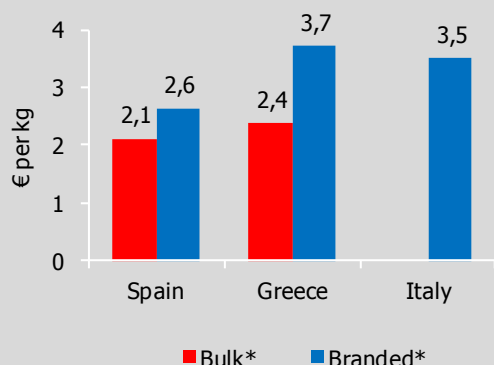
The potential of the Greek olive oil sector in terms of production growth appears to be limited, in light of the decreasing CAP budget and its recent reform and the fact that the profitability of olive farms is highly dependent on subsidies. In fact, Greek production has already followed a downward course during the past 5 years, combined with a decrease in the area of declared olive plantations (by 19 per cent during 2006-2014).

Against this background, there is a need for higher concentration as well as vertical integration in the sector. In particular, relatively larger farms (or more efficient cooperatives) could operate at a lower production cost and attain the critical size in order to have coherent marketing and export strategies. Moreover, better organization along the value chain (including the stages of processing, branding and distribution) could internalize "moral hazard" issues and lead to the distribution of branded products of standardized high quality.

A first step towards that direction would be to switch from bulk to branded olive oil, both in the domestic market (75 per cent bulk, compared with 50 per cent in Spain and 32 per cent in Italy) and exported volumes (70 per cent bulk, compared with 50 per cent in Spain and no bulk in Italy).

In view of the fact that Greece has one of the highest levels of per capita consumption of olive oil, it is clear that the domestic market could be used as the base for the Greek companies to grow. According to our estimates, a potential shift in domestic

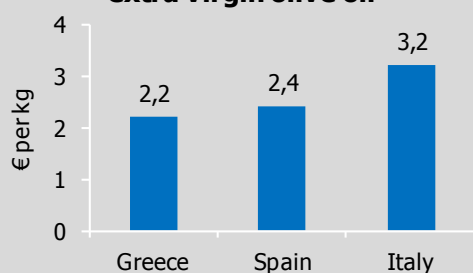
Export prices of virgin olive oil



* Bulk exports are estimated as exports to Italy
 ** Average prices 2010-2013

Source: Eurostat, Comtrade, NBG estimates

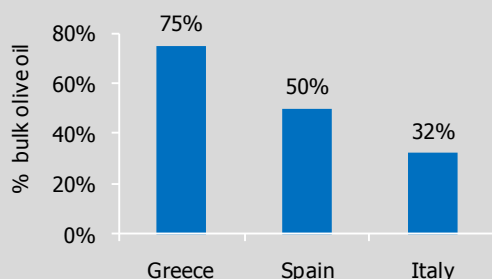
Producer prices of bulk extra virgin olive oil*



* Average producer prices 2010-2013 in Chania (Greece), Jaen (Spain) and Bari (Italy).

Source: IOOC, NBG estimates

Domestic consumption of olive oil in bulk form



Source: EDOEE, EU-MED AGROPOL Project (2005)

consumption from bulk to branded olive oil (meaning an additional volume of about 110,000 tons¹⁴ would enter the manufacturing stage), would increase the average annual turnover of Greek branding companies to approximately €1.2 million – thus gradually closing the gap with their Italian competitors. Another effect from that shift of domestic consumption to branded olive oil would be the increase of government revenues through the Value Added Tax, as those extra tons would pass through official distribution channels. With a retail price of about €6 per kg of branded olive oil and the VAT for olive oil at 13 per cent, those revenues would be around €85 million.

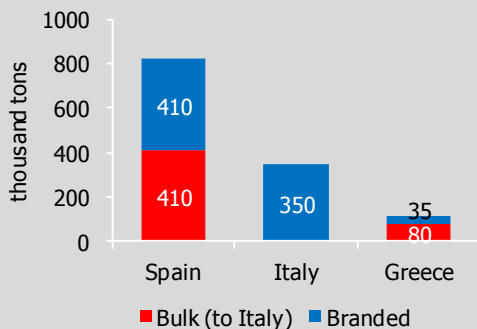
... gaining about €2.3/kg of olive oil...

Furthermore, the higher volumes of branded olive oil would allow Greek manufacturing companies to increase their size and compete on better terms in the international market. It should be noted that Greece remains the country most dependent on Italian distribution channels, as Greek exporters have not managed to increase their penetration to the international olive oil market during the past decade (as did countries like Tunisia, Portugal and Turkey). The benefit from the switch from bulk to branded olive oil is estimated at about €1.3/kg, which is the average price difference in export prices of Greek olive oil to Italy compared with other destinations.

In addition, another step towards the exploitation of the quality of Greek olive oil is the better promotion of the Greek brand. We note that even though Greece enjoys a higher share of high quality extra virgin olive oil (80 per cent of production, compared with 65 per cent in Italy), it has not managed to compete on equal terms with Italian olive oil, which is considered a premium product in the international market. This is reflected in the fact that the producer price of Italian extra virgin olive oil is higher by €1/kg compared with the producer price of Greek extra virgin olive oil (€3.2/kg versus €2.2/kg on average during the past 5 years). The branding strategy would be more effective if it covered a wide range of products from specific regions with common characteristics (like Messinia, Crete) or even the promotion of the Greek brand as a whole, through products that fit certain quality criteria.

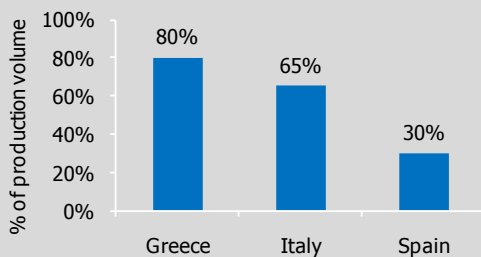
¹⁴ In this scenario, we assume that only the family members of olive farm owners will consume olive oil in bulk form.

Olive oil exports: Three main producers



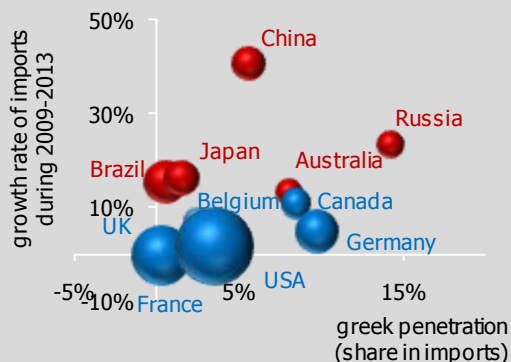
Source: IOOC, Comtrade, NBG estimates

Olive oil quality: (% extra virgin in production)



Source: USITC, "Olive oil-conditions of competition between US and major foreign supplier industries" (August 2013), Market estimates

Penetration of Greek olive oil in basic import countries



* The size of the bubbles concerns the level of annual olive oil imports in each country.

Source: Comtrade, NBG estimates

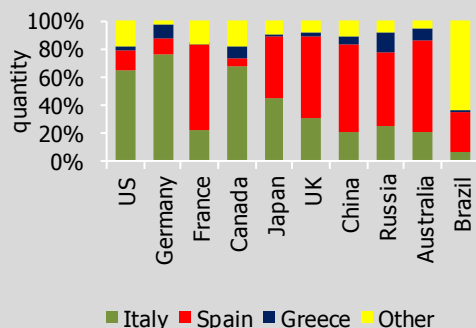
With Greek production estimated to be around 280.000 tons in 2020, the exported quantity could stabilize in the range of 115.000 tons (of which only 35.000 tons are currently branded). Combining the estimated effect from the shift to branded olive oil (€1.3/kg for 80,000 tons of bulk oil) and a more efficient marketing strategy to promote the superiority of Greek olive oil (another €1/kg for the total of 115,000 tons) and taking into account the higher world price (by €0.2/kg), the value of Greek exports could increase by approximately €0.25 billion per year (to €0.56 bn, from around €0.31 billion currently). We note that in this case, the price of Greek exports of olive oil would be €4.7/kg – higher than the Italian exports price – reflecting the fact that Greek exports would be mainly in the form of extra virgin olive oil while Italian exports also include lower quality olive oil (e.g. refined or blends).

... with current market conditions being supportive of this change in strategy

As the focus on targeting the premium segment of the international market appears a necessity, it is fortunate that the conditions in the international market currently seem favorable for undertaking such a strategic shift:

- Consumers in traditional as well as new international markets appear to become more aware of the beneficial qualities of virgin olive oil (in which Greece has an advantage), with its share over refined olive oil increasing from 70 per cent in 1990 to 80 per cent in 2014. In the same vein, international organizations and industry representatives are pushing for more controls and higher quality standards concerning the determination of commercial grades of olive oil. The stricter definition of extra virgin olive oil would offer an advantage for Greek producers (since most of the Greek production is extra virgin olive oil) and allow them to differentiate their product. To that end, Greek producers and olive oil mills can benefit from the wide range of existing frameworks in Europe and Greece (Investment Law, Horizon 2020, Leader and other NSRF actions), supporting investments concerning the processing of agricultural products (with Government support that in certain areas can reach up to 50 per cent). Indicative investments eligible for funding under these frameworks are: purchase of farming machinery and equipment, research and

Basic import countries of branded virgin olive oil



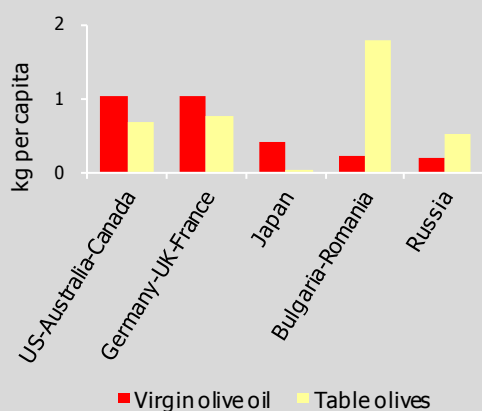
Source: Comtrade (2013), NBG estimates

Relative position of table olives to olives

	1991-1999	2000-2010	2011-2014
Production of table olives (% olives)	4%	5%	9%
Exports of table olives (% olives)	8%	13%	18%
Relative export price (table olives/ olives for oil)	3.7	4.7	4.8

Source: Comtrade, IOOC, NBG estimates

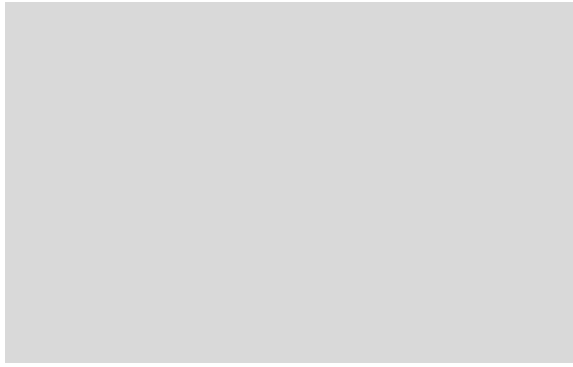
Consumption of virgin olive oil and table olives



Source: International Olive Council (2014), NBG estimates

development, quality control and traceability systems and modernization of processing units (olive mills and bottling).

- Concerning the potential for higher penetration in specific international markets, the markets that have experienced high olive oil import growth during the past five years are China (40 per cent) and Russia (23 per cent), followed by Japan Australia and Brazil (about 15 per cent). Greece has a low market share in these markets, with the highest being in Russia (15 per cent) and could easily increase its presence. Due to the large size of these markets, even a small increase in market share could have significant impact on Greek export levels. It is important to note that most of these markets have not yet been dominated by Italian oil, as is the case in developed, more mature markets, where competition is tougher.
- Another opportunity for attracting consumers is through the dynamic growth of the sector of table olives (see BOX 3) - with its production volume increasing annually by 5 per cent during the past decade and its exports volume by 9 per cent during the same period. Therefore, table olives currently absorb around 9 per cent of the total Greek production of olives (from around 4-5 per cent during 1990-2010). With olive oil being actually the juice of the olive crop, the familiarity with the brand name and the taste of olives could be beneficial. In addition, especially in markets with high consumption of olives, there could be availability of established marketing and distribution channels for Greek olive oil.
- Moreover, Greek olive oil could benefit from the tourism sector - which attracts about 25 million foreign tourists per year in Greece who could become customers of olive oil back in their countries. Note that a crucial factor for the success of this initiative is the promotion of branded olive oil in the domestic market. Specifically, Greek restaurants should replace the refillable bottles of bulk olive oil in their tables with branded bottles of virgin olive oil, concurrently guaranteeing the quality and increasing the awareness for this Greek product. At a second stage, with proper marketing and agro-tourism activities in oil-producing regions, high



quality olive oil could become part of the experience of their visit to Greece (linking the images of Greece with the branding of olive oil). The potential of such initiatives could be substantial – indicatively, if 1 in 10 tourists decides to consume olive oil when they return to their countries (with a low annual consumption of 5 kg), they could absorb the current bulk exports and thus transform them to branded in the course of 6 years.

BOX 3: TABLE OLIVES MARKET

The production of table olives has been a high growth sector in Greece during the past two decades (posting annual average growth of 4 per cent in volume terms). More importantly, by exporting 80 per cent of its production, Greece is established as one of the main global producers of table olives (covering 15 per cent of the international market in volume terms). Greek production consists of many different varieties of table olives, with the most widespread ones being Kalamatas table olives (Kalamon), Conservolia and Chalkidikis table olives.

With global demand on a strong upward trend...

World production of table olives more than doubled in volume terms during the past two decades – reaching 2.6 million tons in 2014. While Spain and Turkey are traditional leaders of this market, it was North Africa (mainly Egypt and secondly Algeria, Morocco and Tunisia) and South America (Argentina and Peru) that led the production boom.

While the increased production was partly absorbed by the producing countries – with North African countries increasing their consumption by 317 per cent during the past two decades – a significant share of the extra production was directed to new markets. In particular, world imports increased by 217 per cent from 1994 to 2014. With the US, EU and Brazil remaining the major markets, Russia is emerging as a key player, with its imports increasing by 30x during the past decade.

... the Greek sector of table olives strengthened...

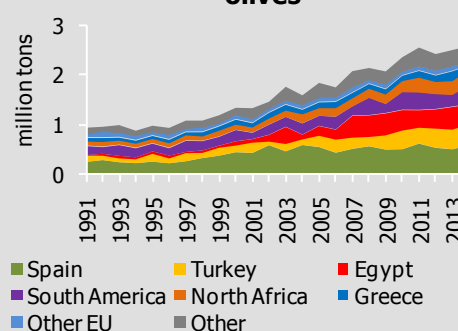
The Greek sector has exploited the international rally of the table olives market and doubled its production volume during the past decade. By directing the extra production to foreign markets, Greek export volume of table olives increased by 167 per cent, with its market share in world exports increasing from 10 per cent in 2004 to 15 per cent in 2014. During that time the export price of Greek table olives increased by about 40 per cent during the past decade, thus further amplifying the gain in value terms for the Greek economy. At this point, we should underline the high quality of Greek table olives, as they have steadily higher price compared with other producers (by about €1 on average during the past decade) and thus seem to target the premium segment of the international market.

This positive outlook is reflected in the strong performance of the Greek

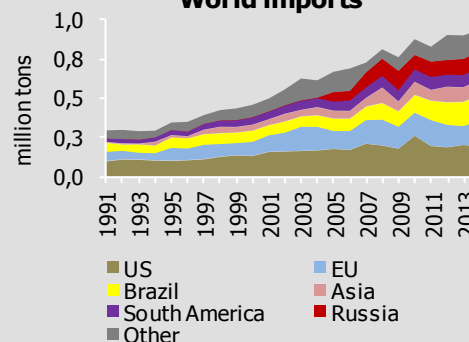
Greek table olive varieties

variety	% domestic production	producer price	region of production
Chalkidikis olives	50%	1.1	Chalkidiki, Kavala
Green olives	30%	1.1	Fthiotida, Fokida, Voiotia
Black olives		1.6-1.8	
Kalamon olives	20%	1.8	Lakonia, Aitolokarnania, Fthiotida, Messinia

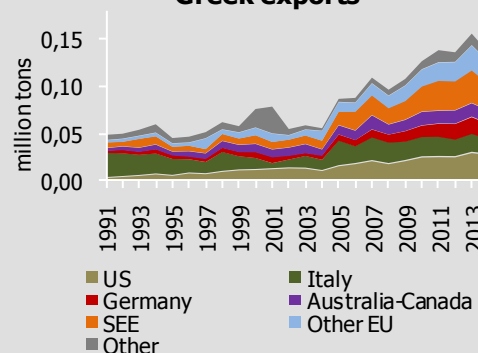
World production of table olives



World imports



Greek exports



companies involved in this sector – which appear more resilient compared with the average performance of the food sector. Specifically, while sales in the food sector had an average growth of 6 per cent during 2004-2011 and remained stagnant during 2012-2013, table olive sales grew by 10 per cent per year during 2004-2011 and by a further 5 per cent per year during 2012-2013.

The healthy status of Greek table olive companies is also confirmed by a series of key financial indices:

- ✓ The profitability for Greek table olives companies (as measured by the EBITDA margin) was significantly higher compared with the food sector (11 per cent in 2012-2013, versus just 6 per cent for the food sector on average).
- ✓ The efficiency (as measured by the asset turnover) is marginally superior compared with the food sector (0.92 versus 0.86).
- ✓ The leverage of Greek table olive companies (as measured by the debt-to-EBITDA ratio) reduced markedly to 3.7 in 2012-2013 from 5.5 in 2004-2011, while the corresponding ratio for the food sector ratio increased to 7.0 from 4.9 during the same period.

At this point, it is important to note that the large companies¹⁵ of the table olives sector (which are mainly the exporting ones) have a stronger financial performance in terms of sales growth, profitability, efficiency and leverage.

... with significant potential remaining still untapped

Summing up, it is evident that the Greek table olives sector utilized the favorable international conditions and grew both in terms of value as well as volume. However, there is still significant untapped potential, as 75 per cent of the Greek exports is in bulk form. As the average bulk price of table olives is approximately 1.5 €/kg while the price of branded olives is about 6.5 €/kg, the extra receipts in case all our exports were branded products could amount to around €0.5 billion per year. Finally, turning to destination markets, we note the extremely low penetration of Greek exports in the Russian market (6 per cent in 2013 versus 25 in other major markets). Note that Russia is the strongest growing market for table olives and is also a traditional market for Greek products (e.g. Greek olive oil exhibits its highest penetration in Russia).

Food: Greek Companies

	2012-13	2004-11
EBITDA margin	6%	10%
Asset turnover	0.86	0.86
Operating cycle	124	141
Debt/EBITDA	6.96	4.87
Z-Score Private	1.19	1.35
Average sales (million €)	10.26	7.7
Average annual sales growth	0.4%	6%

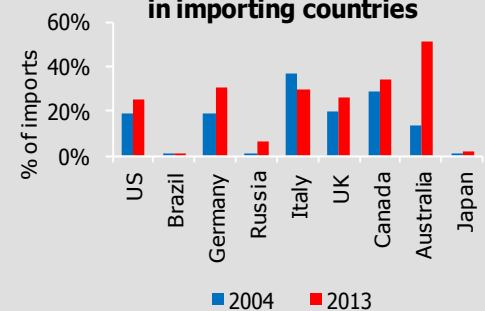
Source: ICAP, NBG estimates

Table olives: Greek Companies

	2012-13	2004-11
EBITDA margin	11%	9%
Asset turnover	0.92	0.81
Operating cycle	186	210
Debt/EBITDA	3.66	5.46
Z-Score Private	1.47	1.27
Average sales (million €)	9.3	6.7
Average annual sales growth	5%	10%

Source: ICAP, NBG estimates

Greek table olives penetration in importing countries



Source: Comtrade, NBG estimates

¹⁵ Companies with annual sales over €10 million.

SECTORAL REPORT

May 2015



NATIONAL BANK OF GREECE

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