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Factors Affecting the Impact of the CAP: The Case of Greece

By

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Summary

Over the past 30 years agriculture in Greece has been regulated and supported through the CAP. The CAP in Greece mainly supports farmers' income through the provision of decoupled payments and implements rural development programs which aim at enhancing the economic sustainability of rural areas and the competitiveness of the whole sector. However, as this study indicates the economic performance of Greek agriculture is rather poor. The sector is chronically characterised by low income, productivity and competitiveness. This poor performance has implications for the country's economy and society, as the sector provides income and employment in rural areas, as well as contributes significantly to the country's exports. Considering that Greek agriculture has been heavily supported by the CAP and the sector's economic and social importance, this study identifies and analyses the factors which limited the CAP's performance in promoting Greek agriculture's income, productivity and competitiveness.

In order to identify and analyse the factors which limited the CAP's performance in Greek agriculture, this study employs a theoretical and empirical household production model, according to the work of Sadoulet and Janvry (1995). With the utilization of this model internal factors determining the sector's performance are identified. The main internal factor is farm behaviour following from profit and utility maximization. This study's analysis indicates that instead of promoting production the CAP has promoted consumption. In addition, external factors are identified. The main external factors are the institutional and intra-EU trade environment the Greek farmers face under the CAP's regime. This study's analysis demonstrates that Greece's institutional environment leads to high transaction costs hindering agricultural production. Moreover, it shows that the appreciation of the currency after entering the euro zone worsened the internal competitive position. This study concludes that the CAP's support provides disincentives to Greek farmers to increase and modernise their production. Furthermore, it concludes that the institutional and intra EU-trade environment in Greece reduces farmers' economic viability and competitiveness. These findings remain to hold significant weight since the CAP is expected to be further liberalized in the future.

Contents

1. Introduction

The Common Agricultural Policy (CAP) is a cornerstone of European integration. The past 50 years it has provided European citizens with food security and rural development. The CAP was initially developed to ensure affordable prices for citizens as well as enable a fair living for farmers. This orientation remained valid over the years, despite the significant adjustments and reforms the CAP has experienced. Today, the policy is undergoing a new reform. Competitiveness of agriculture as well as sustainability of rural areas in the EU are the main strategic objectives which will shape the design of the new CAP (European Commission, 2012).

Greece, as a member of the EU since 1981 has adopted the CAP. Since then agriculture in Greece is regulated and supported through the CAP regime (Kagkou, 2008). This support and regulation aims at improving the competiveness of agriculture and forestry, promoting environmental sustainability and quality of life in rural areas along with encouraging diversification of agricultural activities (Efstratoglou et al., 2011). Regarding the policy's economic scope, under the CAP regime Greece trades freely agricultural products within Europe and holds common tariffs for non-European products. In addition, a set of measures were established concerning farmers' income and stability of agricultural markets along with agricultural productivity and technical progress (Oltheten et al., 2003).

The CAP was and is highly regarded in Greece as the mean for agricultural modernization and rural development. However, CAP's implementation over the years yielded a mix of positive along with negative effects for the sector (Pezaros, 2001). Despite the fact that the sector under the CAP regime was heavily supported (Ventouris and Tsakanikas, 2011), support did not meet its goals to the full extend and furthermore, induced significant negative consequences. As existing literature suggests, the deterioration of the balance trade as well as the inefficient reallocation of agricultural resources which was not in accordance to Greece's comparative advantages were among the main negative effects of support (Oltheten et al., 2003, Kagkou, 2008, Giannakis, 2010, Ventouris and Tsakanikas, 2011). As far as competiveness of Greek agriculture is concerned, contrary to the Northern European countries, modernization initiated and instituted by the CAP did not increase agricultural productivity in Greece (Vounouki, 2009). As support demotivated Greek farmers to increase their productivity, the sector has witnessed a sharp loss in its competiveness (OECD, 2005, Karanikolas and Martinos, 2007, Malliaropulos, 2010, Petropoulos et al. 2013). Moreover, despite the high level of support farmers received, their income decreased significantly over the years (Karanikolas et al., 2008, Ventouris and Tsakanikas, 2011, Klonaris and Vlahos, 2012). Last but not least, regional inequalities of direct payments were observed (Klonaris and Vlahos, 2012), which led to serious income disparities among Greek farmers (Kaditi and Nitsi, 2011).

All the aforementioned negative consequences for agriculture are important for Greece. The sector's overall function and performance affects Greece significantly in economic and social terms, as agriculture in Greece has always held a pivotal and multi-functional role to economy and society (Polyzos and Arabatzis, 2005, Kagkou, 2008, Kaditi and Nitsi, 2010, Iliopoulou and Stratakis, 2011, Koutsou et al., 2011, PASEGES, 2011, Ventouris and Tsakanikas, 2011, Klonaris and Vlahos, 2012). Furthermore, the recent negative

developments in Greek economy caused by the 2009 financial crisis highlight further the role of agriculture in terms of its contribution to the national economy as well to the country's social cohesion. It is argued that the sector has potentials for improvement where a proper utilization of agricultural resources in line with efficient governance and policy, can contribute in the recovery and development of the national economy. In fact, Greek agriculture has comparative advantages in specific commodities as well as in its structural characteristics which can increase its competiveness. More specifically, Greek agriculture is favored with unique climate conditions, high soil and water quality as well as with rich rural heritage (Ventouris and Tsakanikas, 2011, Petropoulos et al., 2013). All these factors enable the production of a large variety of high-value commodities which bear significant potentials for increasing the sector's competiveness and promoting its sustainability and development.

As the CAP is currently undergoing a new reform process towards a more liberal perspective, some authors are skeptical on this new orientation of CAP and on its effects on Greek agriculture (Stoforos, 2003, Rozakis et al., 2008, Efstratoglou et al., 2011, Tzanopoulos et al., 2011). This skepticism concerns the effects agricultural liberalization will have on the financial and economic viability of Greek farms, as well as the sustainable development of rural areas. The debate however on the future of CAP in Greece today, is outweighed by discussions on the critical financial situation of national economy (Klonaris and Vlahos, 2012).

Considering the importance of agriculture in the present-day situation and the expected CAP reform, an assessment of the factors which limit the CAP's performance in Greek agriculture needs to be investigated. Thus, this study aims at examining these factors, in order to provide insights into their effects on Greek agriculture, under the CAP's regime. With the utilization of the theoretical household production model (Sadoulet and Janvry, 1995) these factors are classified in internal and external. Internal factors are identified as those who are shaped by the farmers' utility maximization objective and affect farm income as well as production decisions. On the other hand, external factors are identified as the institutional determinants and the intra-EU trade implications. These internal and external factors' impact is assessed in terms of productivity, income and competiveness of the agricultural sector.

Research objective

The objective of this research is to provide insights into the factors which limit the CAP's performance in Greek agriculture, by examining their effects on Greek farmers' income, productivity, as well as competiveness.

Research questions

1. What is the background and economic importance of Greek agriculture?
2. How has the CAP been implemented in Greek agriculture?
3. What and how did internal factors limited the CAP's performance in Greece?
4. What and how did external factors limited the CAP's performance in Greece?

Methodology

This research is conducted through a literature review for research questions 1 and 2, in order to provide a background of the problem as well as the implementation of the CAP in Greece. Research question 3 will be answered through the employment of a theoretical and empirical household production model, as it can provide with the appropriate theoretical framework to understand and analyze the adverse effects of support to Greek farmers. For answering research question 4, transaction cost theory (North, 1992) will be utilized and according to this theoretical framework the aforementioned model will by adjusted and employed for analyzing the institutional determinants of CAP's performance. In addition, to investigate the intra-EU trade implications effects the theory behind the Dutch disease phenomenon (Corden and Neary, 1982) will be utilized and according to this theoretical framework, the aforementioned model will be adjusted and employed.

Content overview

After the introduction in chapter 1, an overview and background of Greek agriculture is presented in chapter 2. Subsequently, the specifics on the implementation of the CAP in Greece are discussed in chapter 3. Next, in chapter 4 the internal factors causing the negative effects of the CAP are identified and analyzed. Chapter 5 identifies and examines the external factors. Finally, chapter 6 provides conclusions and a general discussion.

2. Background of Greek agriculture

2.1 Introduction

The purpose of this chapter is to illustrate the background of Greek agriculture in terms of its structural characteristics and economic importance. Thus, section 2.2 presents an overview of Greek agricultural land use. Following, section 2.3 identifies the structural characteristics of Greek agricultural holdings. Furthermore, section 2.4 discusses production of Greek agriculture. Section 2.5 presents the economic importance of Greek agriculture and the specifics of its decline over years. Finally, section 2.6 examines the developments in agricultural income levels in Greece over the years.

2.2 Agricultural land

Rural-urban classification typology in Greece depicts a dominance of rural areas, as 82% of the country's total area is identified as predominantly rural (European Commission, 2014). However, 'utilized by agriculture areas' (UAA) accounts for only one quarter of the country's total territory and 71% of these UAA are located in less-favored or mountainous areas (European Commission, 2012). Table 2.1 provides an overview of UAA and land-use patterns in Greece.

Table 2.1 Utilised Agricultural Area by land use in Greece in 2010

	Ha	% of UAA
Arable land	1,767,900	50.8
Cereals	1,018,090	29.3
Pulses (total)	15,660	0.5
Potatoes	20,630	0.6
Sugar beets	18,700	0.5
Fodder roots and brassicas	220	0.0
Industrial crops (total)	262,630	7.6
Fresh vegetables, melons, strawberries	55,580	1.6
Flowers and ornamental plants (total)	590	0.0
Fodder crops	221,240	6.4
Seeds and seedlings	350	0.0
Other crops on arable land	3,200	0.1
Fallow land-total (with and without subsidies)	15,1010	4.3
Kitchen gardens	9,110	0.3
Permanent grassland and meadow	755,660	21.6
Pastures and meadow	272,970	7.8
Rough grazing	461,000	13.3
Land not used for production, eligible for subsides	16,690	0.5
Permanent crops	950,270	27.3
Fruit and berries plantations	108,940	3.1
Citrus plantations	42,770	1.2
Olive plantations	705,960	20.3
Vineyards	86,340	2.5
Nurseries	1,470	0.0
Other permanent crops	4750	0.1
Permanent crops under glass	40	0.0
Total UAA	3,477,930	100.0
Irrigable land	1,300,000	37.0

Source: European Commission, 2012

As indicated in the table 2.1, cereal crop cultivations and olive plantations are the dominant usage of Greek agricultural land. Furthermore, it is evident that irrigation is limited to 37% in Greek total UAA.

2.3 Agricultural holdings

The agricultural sector in Greece is characterized by a high number of agricultural holdings and their low average size. More specifically, the agricultural census in 2010 classified Greece among the countries with the highest number of holdings and with a relatively low average size compared to the rest of the EU. Moreover, these holdings were identified mostly as family owned, with fragmented land and relying mainly on family labour (European

Commission, 2012). The overall picture of Greek agricultural holdings in terms of their structural characteristics is presented in table 2.2.

Table 2.2 Structural characteristics of Greek agricultural holdings in 2012

Number of holdings	723,060
Average size of holdings (ha)	4.8
Livestock units	2,406,520
Number of persons working on farms (regular labour force)	1,212,720
Labour force (AWU[1])	429,520
Standard output (in euro)	6,872,835,240
Agricultural area farmed by landlord (% of total UAA)	62
Agricultural land farmed by tenant (% of total UAA)	35
Agricultural land farmed in partnership (% of total UAA)	3

Note 1: Annual Work Unit as defined by EU

Source: European Commission, 2012

Table 2.3 provides economic and financial characteristics of Greek agricultural holdings. Data originate from the European Union's Farm Accountancy Data Network (FADN) survey for 2012.

Table 2.3 Economic and financial figures of Greek agricultural holdings (average per farm in euro)

Total output	23,496
Total output crops	16,361
Total output livestock	6,904
Intermediate consumption	11,774
Balance subsidies and taxes	5,933
Subsidies - excluding. on investments	6,540
Direct payments	4,860
Support for rural development	617
Gross farm income	17,655
Farm net value added	14,014
Farm net income	11,438
Family farm income	13,453
Total assets	109,758
Total liabilities	405
Net worth	109,353
Farm capital	59,378
Gross investment	797
Net investment	- 2,843

Source: European Commission. FADN survey, 2012

Regarding the average age and educational level of Greek farmers, an examination indicates that only 6.9% of Greek farm-holders are less than 35 years old and farmers older than 64

years old form 33% of the total (European Commission, 2014). A factor responsible for this age distribution is that farming is not particularly attractive for young people in Greece and is held with low regard amongst them (Hellenic Ministry of Rural Development and Food, 2007). Furthermore, the average educational level of Greek farmers is low, as only 4% of them have pursued higher education and 20% have completed secondary education (Ventouris and Tsakanikas, 2011). The low educational level of Greek farmers is partly explained by the ineffective succession tradition which characterizes the sector. To illustrate, young farmers which come into the farming business are mostly untrained and inexperienced as the successor is most likely to be the farmer's son who has the weakest academic achievements and the lowest career aspirations (Gibbard, 1997).

However, the small in size and inefficient Greek farms remain in the productive system, despite the CAP's free-trade regime. This can be partly explained by the socio-cultural characteristics of the rural population in Greece. More particularly, the close links people in rural communities establish, along with the solidarity between family members and the phenomenon of pluractivity, have prolonged the existence of marginal farms (Vounouki, 2009, Koutsou et al., 2011). In addition, the utilization of low-cost labour offered by immigrants has also played an important role into the survival of the Greek small farms. Greek farmers exploited this low-cost labour supply and succeed in achieving economic sustainability (Vounouki, 2009, Ventouris and Tsakanikas, 2011). Last but not least, the CAP has played a decisive role in keeping these farms into the productive system through the provision of direct payments which contribute significantly to Greek farmers' income (Koutsou et al., 2011).

2.4 Production

Production factors in Greek agriculture are distributed 70:30 between crop cultivation and livestock production (Hellenic Ministry of Rural Development and Food, 2007). This unequal distribution can explain partly the chronic deficits the sector faces in the trade of balance of livestock commodities. Hence, shifting production factors into a more equal percentage may benefit the sector's overall competiveness (Ventouris and Tsakanikas, 2011).

Regarding Greek farm structure, the sector is characterized by overwhelming diversity. This is due to the farm household's survival strategies and their efforts to accommodate changes. Daskalopoulou and Petrou (2002) identified three main farm structures namely the subsistence, survivalist and productivist farms. The vast majority of Greek farms are classified as survivalist which depend on the utilization of various combinations of land, labour and capital. Moreover, they were identified as small and medium size farms, which frequently utilize off-farm activities as a complementary source of income (Daskalopoulou and Petrou, 2002).

Despite the fact that Greek agriculture produces a diversity of products, the sector mainly relies on the production of cotton, olive oil as well as fruits and vegetables. Cotton is the main agricultural commodity for the sector as Greece is the largest cotton producer in the EU, producing around 80% of the EU's total production. For 2012, EU as a whole produced 430,083 tons of cotton lint, out of which 85.5% originated from Greece's production (FAOSTAT, 2015). Further, there are approximately 75,000 Greek cotton farms which on

average cultivate an area of 4.5ha. Over 99% of cotton production is grown using irrigation (European Commission, 2007). Furthermore, olive oil is also a significant commodity for Greece, as the country is the third (after Spain and Italy) olive oil producer in the world. Specialized olive farms are the most widespread in Greece as they account for 38% of total farms (European Commission, 2012). Furthermore, there are 531,000 specialized and non-specialized olive oil farms in Greece cultivating on average an area of 1.6ha (European Commission, 2012). In addition, Greece is the largest producer of virgin olive oil in the EU. Olive oil's importance is also depicted by the country's domestic consumption levels, as the annual per capita olive oil consumption in Greece is the highest in the world (Karipidis et al., 2005). Finally, the production of fruits and vegetables is also important for Greek agriculture as the country produces 8% of total fruit production and 6% of total vegetables production in the EU (European Commission, 2004). Holdings which engage in the cultivation of fruits and vegetables use on average an area from 0.1 to 0.4 ha. Indicative for the sub-sector's importance is that consumption of fruits and vegetables in Greece is the highest in the EU (NL Embassy, 2012).

Regarding organic farming, the number of holdings which engage in organic production has increased dramatically from 1,460 in 2000 to 27,700 in 2007 (European Commission, 2012). This increase was mainly due to the CAP's subsidies which incentivized Greek farmers to adopt organic production methods (Iliopoulou & Stratakis, 2011). Although in 2010, agricultural holdings practicing organic farming decreased to 14,530 accounting for 3.3% of Greece's total UAA (European Commission, 2012).

Finally, 85 Greek agricultural commodities are certified as Protected Designation of Origin (PDOs) or Protected Geographical Indication (PGIs) products, with feta cheese, table olives and olive oils being the most popular (Kagkou, 2008).

2.5 Economic importance of agriculture

Agriculture has historically been playing an important role in Greece's economy, as it contributes significantly to the country's social cohesion and overall development progress (Koutsou et al., 2011). More particularly, the sector provides incomes for rural areas and establishes critical horizontal connections with other important sectors as trade and tourism (Polyzos and Arabatzis, 2005). Hence, throughout this overlapping it shapes to a large extent the level of the country's economic development and sustainability. This multifunctional role of agriculture in Greece is widespread valued by the Greek population. To illustrate, Greek citizens' positive attitude regarding agriculture and rural heritage, are among the highest in EU according to the 2010 Eurobarometer survey. Results from this survey indicate that 96% of Greek citizens attach particularly high importance to agriculture and 97% are strongly in favor of granting support to farmers (European Commission, 2010).

In economic terms, the importance of agriculture for Greece is highlighted by its share in national GDP, employment and trade levels. Regarding the GDP share, the sector's share over the years is significant by showing a higher percentage than the EU's average. In fact, for the period 2010-2014 agriculture's share in GDP was on average 4% (World Bank, 2014). Table 2.4 depicts Greek agriculture's contribution to the country's GDP.

Table 2.4 Agriculture, value added
(% of GDP and value added[1] in million euro)

	1995	2000	2005	2010	2013
Greece					
Share of GDP	8.0	6.0	4.8	3.2	3.8
Value added	6,852	7,652	8,595	6,501	6,106
Euro area					
Share of GDP	2.8	2.3	1.8	1.6	1.7
Value added	130,614	145,409	138,621	140,553	154,408

Note 1: In current prices
Source: World Bank Indicators, 2014 and own calculations

As depicted above, Greek agriculture's share to GDP is constantly declining over the years. This declining importance of agriculture cannot be perceived as a negative development; as it is observed in any other developed country, production factors are released from agriculture to be utilized in the tertiary sector (Ventouris and Tsakanikas, 2011). However, a comparison with agriculture's importance for the Euro area's economy as a whole indicates that the sector still contributes significantly to the Greek economy.

Further, the sector's contribution to Greece is also illustrated by its share in the country's employment. More particularly, 13% of Greece's labour force is employed in agriculture while EU's average is around 3.5% (World Bank, 2014). In fact, the agricultural sector in Greece is the second largest employee after trade (PASEGES, 2011) and due to the recent developments in the national economy, a marginal increase in agriculture's share in employment levels is observed (Ventouris and Tsakanikas, 2011). However, employment in Greek agriculture is decreasing over the years, which is justified by the national's economy transformation from primary-based to tertiary-based (Iliopoulou and Stratakis, 2011). Table 2.5 clarifies this transformation by indicating sectoral employment in Greece from 1995 to 2013. In this table, total employment is measured as the economically active population with age 15 and above, excluding the unemployed economically active population. Moreover, percentage of total and sectoral employment corresponds to persons who work in each sector for public or private employers and receive remuneration for their work (World Bank, 2014).

Table 2.5 Employment by sector (% of total and sectoral)

	1995	2000	2005	2010	2013
Agriculture					
Greece					
Percentage	20.5	17.4	12.5	12.5	13.0
Sectoral	841,065	753,360	569,682	563,139	468,940
Euro area					
Percentage	6.1	5.2	4.8	3.8	3.6
Sectoral	7,589,632	6,893,286	6,748,275	5,454,104	5,092,066
Industry					
Greece					
Percentage	23.2	22.6	22.4	19.7	16.7
Sectoral	951,840	978,503	1,020,871	887,508	602,407
Euro area					
Percentage	31.5	30.1	27.8	25.5	25.1
Sectoral	39,192,364	39,901,524	39,083,759	36,599,911	35,503,020
Services					
Greece					
Percentage	56.3	60.0	65.1	67.8	70.3
Sectoral	2,309,853	2,597,796	2,966,906	3,054,469	2,535,884
Euro area					
Percentage	62.4	64.7	67.4	70.7	71.3
Sectoral	77,638,207	85,768,393	94,757,028	101,475,049	100,851,208

Source: World Band Indicators, 2014 and own calculations

From table 2.5 it can be concluded that similarly to the Euro area, the Greek economy is transforming to a tertiary-based economy. Although, Greek agriculture still absorbs a considerable amount of the country's labour force compared to the Euro area.

Moreover, agriculture's importance in the Greek economy is also reflected in the sector's share in total exports. Indicative for this importance is that agricultural exports in 2013 accounted for 17.8% of the country's total exports (European Commission, 2014). Hence, in a progressively globalized and liberalized economy, agriculture holds a critical role for Greece's economic development and sustainability. Regarding the structure of the Greek agricultural exports, the CAP's free trade regime favours intra-EU trade as 65.6% of total agricultural exports regard trade within the EU borders. The main importer of Greek agricultural products within the EU is Italy by holding an 18% share of Greece's total exports to the rest of the world. Following, Germany imports 14%, and the United Kingdom imports 7% of Greece's total agricultural exports. Exports to the rest of the world may hold potentials for increase and more specifically to countries as Russia, Canada, China and India (Spanellis, 2011). Regarding Greece's agricultural imports, the majority come from EU member states, accounting for 79% of Greece total agricultural imports. The main exporters of agricultural products to Greece are Germany and the Netherlands holding a share of 13% each and France holding a 12% share in Greece's total agricultural imports (Spanellis, 2011).

Greece faces chronic deficits in the agricultural balance of trade. For 2013, Greece imported 6,048.5 million euro in agricultural products and exported products valued 4,896 million euros, indicating a trade deficit of 1,152.5 million euros (European Commission, 2014). Table 2.6 demonstrates the historical agricultural trade deficit of Greece.

Table 2.6 Agricultural trade balance of Greece
(trade balance values[1] in thousand euro)

Year	Trade deficit
1980	128,872
1981	32,004
1982	-30,206
1983	193,430
1984	327,759
1985	-84,838
1990	-444,103
1995	-450,515
2000	-666,879
2001	-805,577
2002	-1,329,624
2003	-1,565,666
2004	-2,115,862
2005	-1,737,173
2006	-1,830,230
2007	-2,558,939
2008	-2,655,796
2009	-2,155,189
2010	-1,800,016
2011	-1,921,471

Note 1: In base prices
Source: FAOSTAT Trade indices, 2015

Table 2.6 indicates that after the CAP's implementation in Greece in 1981 the country faced an increasing agricultural trade deficit. In fact, since the implementation of the single currency regime in the Euro area in 2001, this agricultural trade deficit in Greece increased significantly. This increasing deficit peaked in 2008 when agricultural imports outweighed imports by 2,655 million euros. After 2008 due to the economic crisis the deficit decreased.

2.6 Agricultural income

Agricultural income in Greece has witnessed a significant increase over the years, mainly due to the CAP's direct payments to Greek farmers. Indicative for this positive development is the comparison between the 1993 and 2000 total income levels, which demonstrates a 47% increase. However, since 2000 agricultural income has witness fluctuations and eventually a

steady decline (El.Stat., 2013). Table 2.7 examines the developments in agricultural income in Greece over the years.

Table 2.7 Development of the agricultural income per Annual Working Unit (2005=100)

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Greece	100	95.9	103.9	104.7	123.6	115.4	111.5	112.8	107.5
EU average	100	104.2	115.7	112.5	102.3	120.6	130.6	130.8	129.2

Source: European Commission, 2013

As table 2.7 illustrates, agricultural income increased until 2009 but since then it has been declining. Latest figures indicate a 4.9% decrease in 2013 compared to 2012.

Moreover, producer prices for Greek farmers have decreased significantly over the years but production costs have increased (PASEGES, 2011, Ventouris and Tsakanikas, 2011). These developments deteriorated income levels of Greek farmers as a whole and therefore, constitute farm households in the low-income groups of Greece's society (Karanikolas and Zografakis, 2009). Table 2.8 provides a comparison between 2005 and 2012 in terms of structural characteristics of Greek agricultural income. In this table, gross value added (GVA) is measured as output of the agricultural industry at basic prices minus intermediate consumption. Moreover, factor income is measured as net value added at basic prices including the balance of current subsidies and taxes on production (European Commission, 2013).

Table 2.8 Structure of agricultural income in Greece (million euro)

	2005	2012
Output of the agricultural industry	12,095	10,752
Intermediate consumption	4,495	5,252
GVA	7,600	5,500
Factor income	7,169	6,064

Source: European Commission, 2013

Table 2.8 shows that production costs have increased and agricultural income has declined in this time period.

3. The CAP's implementation in Greece

3.1 Introduction

The purpose of this chapter is to provide an overview of the CAP's implementation in Greece in the past years. Therefore, section 3.2 depicts the overall EU context into which the CAP was implemented in Greece. Section 3.3 presents the budgetary guidelines of the CAP in Greece. Section 3.4 illustrates the specifics of CAP's implementation in Greek agriculture over the years. Finally, section 3.5 discusses the future orientation of the CAP in Greece.

3.2 Policy overview

The CAP was launched in 1962 and it focused mainly on the implementation of price support measures for EU farmers which eventually, stabilized their income and achieved food security for the EU (European Commission, 2012). However, when Greece entered the CAP's regime in the early 1980s, the CAP already had induced two serious market and fiscal distortions. The market distortions concerned the generation of huge food surpluses, which were the result of the price support measures. The fiscal distortion concerned the high volumes of the EU community's funds that CAP absorbed in order to implement its policies. These distortions made CAP's measures unpopular among EU's consumers and taxpayers and indicated that the CAP did not address efficiently EU farmers' interests. In addition, over the years EU's environmental policy agenda increasingly gained weight, in terms of the sustainability of agriculture. Therefore, Greece's accession to the CAP regime concurred with a gradual policy transformation towards measures to address the aforementioned concerns. Hence, a reform process of the CAP was instituted which entailed a movement towards the abolition of price support measures to farmers and their substitution with decoupled from production direct payments. In addition, a ceiling on CAP's budget was set in order to stabilize the CAP's expenditures. Further, the policy entailed measures which focus on environmental sustainability and development of rural areas (Hellenic Ministry of Rural Development and Food, 2011).

3.3 The CAP's budget

The CAP's budget is decided on a 7 year basis by the Council of the EU and the European Parliament and it is spent on two sets of measures or pillars (European Commission, 2013).

The first pillar is entirely financed from the European Agricultural Guarantee Fund (EAGF) and incorporates direct payments to farmers and market support measures. The direct payments include the Single Payment Scheme (SPS) and the Single Area Payment Scheme (SAPS) and they are provided directly to beneficiary farmers. Besides providing income support to farmers, these two schemes also promote compliance with sustainable agriculture practices (i.e. cross-compliance). Their importance is illustrated in the funding they absorb, as 70% of the CAP's budget is spent on income support measures. Moreover, the market measures aim at balancing the agricultural supply chains, by facilitating organization of farmers and providing compensation for adverse weather conditions. Market support measures absorb 10% of the CAP's budget.

The second pillar is co-financed from the European Agricultural Fund for Rural Development (EAFRD) and from EU's member states sources and absorbs 20% of the CAP's budget. Its measures target modernization and competition of agriculture, as well as environmental protection and development of rural communities.

However, the spending of the CAP's funds in each EU member state is subject to national economic, environmental and social prioritization. This implies that the policy provides certain flexibility to each member state to adjust the spending according to its national strategy (European Commission, 2014). For Greece, the payment authority of the CAP's funds is OPEKE. This private-legal entity operates since 2001 and it is supervised by the Ministry of Rural Development and Food. Its mission is to administer and control payments of beneficiaries, in line with the European and Greek laws. According to OPEKEPE's figures, every year around 900,000 beneficiaries receive approximately 3 billion euros of EU payments. They are mostly farmers and agricultural cooperatives, export companies, investors and manufacturing enterprises (OPEKEPE, 2015).

In order to depict the picture of CAP's spending in Greek agriculture, the following tables provide a historical examination and comparison with the EU 27 expenditure levels. More specifically, Table 3.1 provides an overview of EAGF expenditure in Greek and EU 27 agriculture for a time span of 6 years.

Table 3.1 EAGF expenditure
(million euro in real prices[1])

	2007	2008	2009	2010	2011	2012
Greece	2,608.8	2,483.4	2,566.3	2,485.7	2,385.7	2,379.4
EU 27	40,659.8	40,526.0	42,541.1	43,271.5	42,877.3	43,706.3

Note 1: Adjustment from nominal prices to real prices by using the World Bank deflator index
Source: European Commission, 2013 and own calculations

Table 3.1 indicates that there has been an overall downward trend in CAP's spending on direct payments and market support measures to Greek farmers.

Regarding CAP's funds for rural development in Greece, table 3.2 provides with an overview for the same time period.

Table 3.2 EAFRD expenditure
(million euro in real prices[1])

	2007	2008	2009	2010	2011	2012
Greece	449.0	450.7	448.5	517.6	654.8	658.8
EU 27	9,257.4	14,232.1	13,572.8	14,477.0	14,174.5	14,365.8

Note 1: Adjustment from nominal prices to real prices by using the World Bank deflator index
Source: European Commission, 2013 and own calculations

As Table 3.2 illustrates, there has been a significant increase of 46.7% in CAP's spending on rural development measures in Greece from 2007 to 2012. In the same line, EU 27 as a whole spendings from CAP's fund on rural development measures increased for the same period by 55.1%. These figures are indicative of the policy's overall transformation to target environmental and sustainability issues of EU's countryside.

In order to complete the picture of the financial aspects of the CAP in Greece, Table 3.3 demonstrates the development of national expenditure levels for agriculture for Greece and the EU 27 as a whole. Such an examination is critical as the second pillar of the CAP's budget is, as indicated above, co-financed by individual member states' sources.

Table 3.3 National expenditure for agriculture
(million euro in real prices[1])

	2007	2008	2009	2010	2011	2012
Greece	321.1	620.4	638.0	206.4	404.3	322.0
EU 27	11,029.0	11,269.7	10,594.8	9,117.3	8,718.2	8,636.7

Note 1: Adjustment from nominal prices to real prices by using the World Bank deflator index
Source: European Commission, 2013 and own calculations

In the table above, serious fluctuation in Greece's spending on agriculture are observed. However, EU's member states as a whole have been decreasing their spending on agriculture.

3.4 Implementation of the CAP in Greece

Before examining the specific composition of the CAP's measures in Greek agriculture, it is essential to provide some background information on the CAP's implementation in Greece.

Regarding the direct payments to Greek farmers, they are being instituted under the SPS initiated for Greece in 2006. The model of SPS which is implemented is based on SPS historical levels, with minimum requirements of 200 euro. The budgetary ceiling for the SPS in Greece for 2012 was 2,225,227 thousand euro. The budgetary ceiling for specific support measures for 2012 was 108,000 thousand euros. Greece does not have agricultural area under the SAPS (European Commission, 2013).

As far as the CAP's support for Greek agriculture's main products is concerned, cotton producers are supported by means of coupled payments and decoupled payments. Coupled payments account for 35% and decoupled 65% of the CAP's support. This distribution of support is due to the high risk embedded in cotton production (USDA, 2013). Greek olive oil producers receive mainly decoupled and to a lesser extend coupled payments. In addition, the CAP provides market support measures to olive oil producers which target quality of the product by promoting organic, integrated and PDO/PGI farming (European Commission, 2012). Furthermore, market measures for olive oil entail action plans which focus on quality and control and plans which promote the development of the sub-sector and the restructuring of the industry e.g. by efficient promotion of products. Moreover, olive oil market support measures incorporate actions which administer the competition with non-EU countries and facilitate the establishment of the International Olive Council (European Commission, 2014). Regarding the fruit and vegetables sub-sector farmers receive mainly decoupled payments and market support measures which aim at promoting organic production and sustainable management practices. More specifically, the market support measures consist of instruments which encourage producer organizations, provide income relief from fluctuations caused by crises, promote greater consumption and enable sustainable cultivation and production (European Commission, 2007). Finally, regarding the wine sub-sector the CAP besides the

provision of decoupled payment support to farmers, implements instruments which aim at promoting wine products to non-EU countries, facilitate reconstruction of wineries and wine supply chains, as well as enabling sustainable and risk averse cultivation practices (Hellenic Ministry of Rural Development and Food, 2008).

As far as the rural development programs which are implemented in Greece are concerned, they mainly consist of measures which aim at improving the environment and the countryside, by promoting sustainable land management. More specifically, they are agri-environmental payments, payments to farmers located in mountainous or other less-favored areas and afforestation measures. Furthermore, rural development programs target competitiveness of the Greek agricultural and forestry sectors. These programs consist mainly of infrastructure related measures and measures which facilitate agricultural holdings adaptation to the common market organization. Moreover, there are measures which promote young farmers, as well as modernization of existing holdings (European Commission, 2013). Table 3.4 presents an overview of the rural development programs which were implemented in Greece for the period 2007 – 2012.

Table 3.4 Rural Development Programs in Greece for 2007 – 2012

Measures	Expenditure (thousand euro)	Percentage[1]
Competitiveness of the agricultural and forestry sector	484,348	26.4
Environment and countryside	1,273,326	69.5
Quality of life in rural areas / Diversification of economic activities	46,885	2.6
LEADER[2]	23,181	1.3
Technical assistance	4,666	0.3
Total	1,832,405	100,00

Note 1: Percentage of total expenditure of rural development programs

Note 2: LEADER program promotes rural development projects at the local level and facilitates job creation.

Source: European Commission, 2013

The table 3.4 indicates that programs targeting Greek environment and countryside are considered as the most critical and thus, absorbed the vast majority of the funds for rural development.

Table 3.5 provides an examination of the overall distribution of the CAP's funds in Greece.

Table 3.5 CAP expenditure for Greece
in thousand euro

Measures	2012
Decoupled direct aids	2,039,727.0
Other direct aids	275,566.6
Additional amounts of aid	-44.7
Direct payments	2,315,248.9
Cereals	0.0
Rice	0.0
Food programs	25,453.0
Sugar	0.0
Olive oil	7,901.0
Textile plants	3,983.2
Fruits and vegetables	14,773.0
Wine sector	7,387.2
Promotion	4,192.0
Other plants/products measures	5,030.8
Milk and milk products	-4,555.0
Beef and veal	23.0
Sheepmeat and goatmeat	0.0
Pigmeat, eggs poultry and other	2,809.3
Sugar restricting fund	0.0
Market measures	66,997.6
Rural development[1]	669,030.4
Total	3,051,276.8

Note 1: Rural development programs are co-financed by EAFRD and Greek national funds
Source: European Commission, 2014

Table 3.5 demonstrates that the CAP's funds go for 75.8% to direct payments to Greek farmers, for 2.2% to market measures and for 21.2% to rural development measures. Such a distribution is indicative for the country's strategic priorities. About the specifics of the table, food programs concern the provision of food to Greek citizens under the poverty live. The negative sign in milk and milk products indicates that under the milk quota regime, Greek farmers have exceeded the quota ceiling on delivered milk and thus, were penalized with a superlevy on the over-quota amount (European Commission, 2006). In addition, table 3.5 indicates that the sub-sector of fruits and vegetables along with the olive oil and wine sub-sectors are the most favored by the CAP's market measures.

Table 3.6 provides an overview of the distribution of direct payments according to the economic size of the aid.

Table 3.6 Direct payments by economic size of aid in Greece in 2012

	Beneficiaries		Payments in euro	
Size-class of aid (euro)	(x 1,000)	(% of total)	(x 1,000)	(% of total)
< 0	0.04	0.0	- 128	0.0
≥ 0 and < 500	163.38	22.5	52,291	2.3
≥ 500 and < 1,250	188.22	25.9	155,500	6.7
≥ 1,250 and < 2,000	91.59	12.6	145,705	6.3
≥ 2,000 and < 5,000	148.51	20,4	476,351	20.6
≥ 5,000 and < 10,000	87.08	12.0	608,057	26.3
≥ 10,000 and < 20,000	35.48	4.9	478,999	20.7
≥ 20,000 and < 50,000	11.68	1.6	330,685	14.3
≥ 50,000 and < 100,000	0.97	0.1	60,490	2.6
≥ 100,000 and < 150,000	0.06	0.0	6,549	0.3
≥ 150,000 and < 200,000	-	0.0	521	0.0
≥ 200,000 and < 250,000	-	0.0	228	0.0
≥ 250,000 and < 300,000	-	0.0	0.0	0.0
≥ 300,000 and < 500,000	-	0.0	0.0	0.0
≥ 500,000	-	0.0	0.0	0.0
Total	727.01	100.0	2,315,248	100.0

Source: European Commission, 2014

Table 3.2 indicates that the ≥ 500 and < 1,250 euro size-class of aid was the most frequent, in terms of number of beneficiaries. More specifically, 25.9% of the total direct aid beneficiaries received this amount of payment. On the other hand, the size class of aid which absorbed the most funds was the ≥ 5,000 and < 10,000 euro, as it absorbed 608,057 thousand euro which was the 26.3% of the total amount of direct aid provided to Greek farmers.

Finally, table 3.7 examines the historical levels of direct aid offered to Greek farmers by the CAP's funds. Such an overview is critical as the vast majority of the CAP's funds are spent on direct payment measures. Thus, the following table provides useful insights in the CAP's implementation in Greek agriculture over the years.

Table 3.7 Direct aid to producers in Greece in real prices[1]

	Total direct aid to producers (1000 euro)	Beneficiaries (x 1000)	Average (euro)
2002-2003	1,230,883	924.72	1331.09
2004	1,375,219	885.38	1553.25
2005	1,425,106	835.84	1705.00
2006	1,569,732	806.08	1947.36
2007	2,406,097	942.25	2553.57
2008	2,339,395	872.01	2682.76
2009	2,469,816	872.57	2830.51
2010	2,425,126	839.60	2888.43
2011	2,315,534	740.76	3125.89
2012	2,279,805	727.01	3135.86
2013	2,250,914	702.24	3205.33

Note 1: Adjustment from nominal prices to real prices by using the World Bank deflator index
Source: European Commission, 2014 and own calculations

Through table 3.7 an upward trend in CAP's expenditure of direct aid to Greek farmers is observed from 2002 to 2009. However, from 2009 to 2013 there is a significant decrease by 8.8% in the direct aid Greek farmers receive from the CAP's funds. In the same line, the number of beneficiaries for CAP's direct payments has been decreasing since 2007.

3.5 Future of the CAP in Greece

In 2013 the CAP has been reformed towards a new framework to address the challenges that agriculture faces currently. These challenges reflect the current economic, environmental and territorial concerns within the EU. Regarding the economic concerns, the impact of the 2008 financial crisis has been placing high pressure on the CAP's budget, as EU's policies are in competition for acquisition of resources. Furthermore, there are concerns regarding the increasing price volatility and production costs which the farmers face, along with the decreasing rate of productivity growth in agriculture and the farmers' deteriorating position in the supply chain. Regarding the environmental concerns, they consist of resource efficiency issues, as well as issues of water and soil quality. Finally, the territorial concerns refer to the depopulation of rural areas and relocation of businesses (European Commission, 2013).

In order to address these concerns, the 2013 CAP's reform establishes a more restrict allocation of resources, as its budget for the period 2014-2020 will remain at the 2013 levels. This in real terms implies a 1.8% decrease in the first pillar's funds and a 7.6% decrease in the second's. Additionally, the reformed CAP institutes a clearer interconnection between each pillar's measures. More specifically, the CAP's new "Green" direct payment scheme rewards farmers who engage in sustainable production by maintaining permanent grasslands, preserving ecological areas and promoting crop diversification. Furthermore, under the aforementioned budgetary pressure, the reformed CAP establishes a more efficient allocation of its funds by providing support only to farmers who actively engage in production. In addition, the decreased first pillar's budget raises the need for a more equitable and transparent distribution of funds between EU member states and between farmers. These

equity issues will be addressed throughout the gradual transformation of the current direct payment scheme, which is based on historic levels of production, towards a flat-rate per ha payment which will be calculated per region (European Commission, 2013).

For Greece, the reformed CAP is programed to invest approximately 19.5 billion euro for the period of 2014-2020. The vast majority of these funds are programed to provide income support to Greek farmers, which is estimated to be 15.4 billion euro in the next 7 years. These direct payments will be implemented based on the aforementioned environmental and fairer distribution of funds concerns. Further, from 2015 the scheme of historical references will be abolished and income support will be gradually transformed to the aforementioned flat-rate scheme. As far as the future's CAP market measures in Greece are concerned, they will be further supported and continued. Additionally, for Greece and for the rest EU member states milk quotas have been abolished on 1 April 2015. Regarding the second pillar of the future CAP in Greece, 4,196 million euro is programed to be spend on rural development programs. These programs will address competitiveness of agriculture, perseverance of ecosystems, employment and innovation of economic activities in rural areas (European Commission, 2014).

4. Household production model and internal factors

4.1 Introduction

Given that the CAP in Greece had limited success in promoting farmers' income, productivity and competitiveness, the purpose of this chapter is to employ a theoretical and empirical model in order to identify and analyse the factors which caused these adverse policy effects. This model is based on the organization of a family farm. Using this model internal and external factors are identified that impact income from farming, productivity and competitiveness. This chapter will explore the internal factors, leaving the examination of the external factors to chapter 5. Therefore, chapter 4 is organized as follows: section 4.2 describes the framework upon which the theoretical and empirical model is constructed. Section 4.3 identifies the internal factors and provides a theoretical background of their impact. Section 4.4 presents actual data which can be utilised for building an empirical model based on the presented theoretical framework. Section 4.5 proceeds in the specification of the theoretical model which represents the family farm's organisation. Finally, in section 4.6 an empirical model is presented which analyses the internal factor's effects.

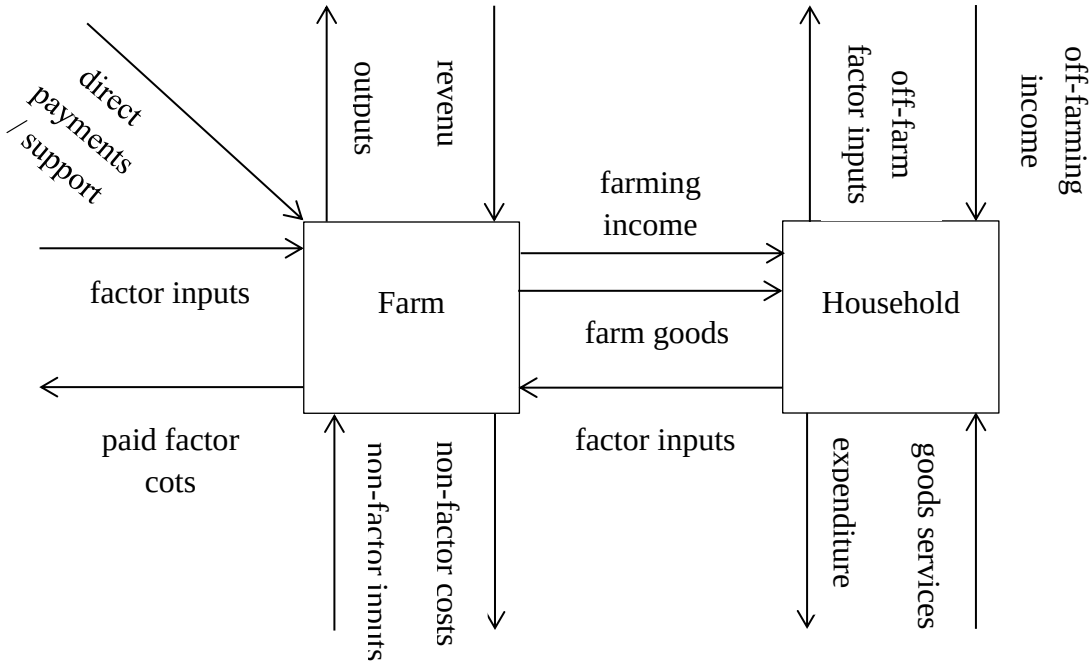
4.2 Household production framework

In order to analyse the factors which caused the CAP's adverse effects, it is important to focus on family farms' economic behaviour since they are dominant in Greek agriculture. For this purpose a theoretical and empirical model have been developed. Applying both models enables to examine the Greek family farms' behaviour under the CAP regime. Both models are based on the household production theory as developed by Sadoulet and de Janvry (1995). In household production theory, the farm and the household of the farm are identified as a non-separable entity. This is due to the fact that the farm supplies a part of its outputs to its household and the household supply inputs to its farm's production. The explanation of such an organisation of the farm/household is that family farms are often located in remote rural areas with poor infrastructure and imperfect markets. This remoteness along with the poor infrastructure induces high transportation costs to farms to acquire their inputs and sell their outputs through market transactions. In addition, the imperfect markets restrict the farms' prospects in engaging in beneficial market transactions for acquiring inputs and selling outputs. Thus, in their efforts to overcome these setbacks, the farms face high costs. All these transportation and market participation costs are identified as transaction costs. When the transaction costs that a family farm faces are significantly high, it is more profitable for the farm to supply its outputs to its household and/or for the household to supply inputs to its farm. As the household supplies factor inputs to its farm, it is therefore the residual claimant of the farm's income. Hence, the production decisions of the farm affect the income of the household, which in turn shapes its consumption decisions. In addition, the decisions of the farm on how much to produce and on the amount of its output that it supplies to its household, affect the consumption of the household. Furthermore, the consumption decisions of the household determine the amount of income that is spend on consumption and the amount that is saved or invested in capital for the farm's production. As investments affect production, the consumption decisions of the household eventually influence the production of its farm.

Considering these, the transaction costs that the farm/household faces in participating in markets incentivise it to organise its production and consumption in a non-separable framework. Hence, there is no separability between the farm and the household, as production and consumption decisions are closely interrelated (Sadoulet and de Janvry, 1995).

The production and consumption decisions which the farm/household takes are represented by the choices it makes on how to allocate its available resources. The farm/household's available resources are the factor and non-factor inputs it utilizes in the farm's production, as well as the factor inputs it supplies to non-farming activities. More particularly, the farm utilizes factor inputs which are labour, land and capital. These inputs derive from the farm's household in the form of family labour and family owned land and capital, as well as from external sources in the form of hired labour and rented land/capital. The utilization of the factor inputs which derive from the farm's household imposes normative costs to the farm. The utilization of the factor inputs deriving from external sources have costs which are identified as paid-factor costs. Furthermore, the farm utilises in its production non-factor inputs such as water, fertilizers, pesticides, etc. The usage of these non-factor inputs imposes non-factor costs to the farm. The farm utilizes these factor and non-factor inputs and produces outputs. These outputs are sold into markets which provide income to the farm in the form of profits. Additionally, the farm receives direct payments and/or other support. The farm's household is the residual claimant of these income from farming and direct payments/support. However, the household has also income from the supply of factor inputs to economic activities other than its farm's production. All these profits, direct payments/support and off-farm income constitute the household's full income. Finally, the household spends this full income to the consumption of goods and services and savings. The value of the household's consumption of good and services is identified as its expenditure. Total income of the household minus expenditure equals savings. Figure 4.1 illustrates the framework of the farm/household's organisation.

Figure 4.1 Farm/household framework



Source: Peerlings, 2014

By aiming at an optimal allocation of its resources, the farm/household maximizes its objectives which are represented by the profit function for the farm and the utility function for the household. Due to the aforementioned non-separability of the farm/household, these functions are maximised simultaneously.

Regarding the profit function, the farm aims at maximizing the difference between revenues from farming minus factor plus non-factor costs. This maximization process is carried under a technological and market constraint. The technological constraint is an expression of the farm/household's available technology which is the procedure of transforming its inputs into outputs. Additionally, the market constraint indicates that the farm/household takes market prices as exogenous. Such an assumption is plausible as the small in size family farm cannot set or influence market prices. In the profit maximisation process labour, land and capital (i.e. factor inputs) are assumed to be fixed in the short-term. This implies that the farm is maximising its short-term profit function which is a function of non-factor inputs prices, output prices and factor input quantities. Under this framework, the farm's behaviour is expressed by a set of functions which are the aforementioned profit function, the output supply functions, the input demand functions and the shadow price equations of the factor inputs. The output supply functions are derived by differentiating the profit function with respect to the prices of the outputs. The input demand functions are derived by differentiating the profit function with respect to the prices of the inputs. These output supply and input demand functions are also called netput equations. These netput equations reflect the change in the farm's profits caused by a change in the output/input prices. The shadow prices are a measurement of the farmer's willingness to pay for an extra quantity of a factor input and they are derived by differentiating the profit function with respect to the quantity of a factor input. They reflect the change in profits caused by a change

in the factor input quantities. The inverse of the shadow price equation expresses the demand for a factor input if it would not be fixed as assumed.

As far as the household's utility function is concerned, the term utility refers to the satisfaction an economic actor receives by consuming goods and services (Louhichi et al., 2013). In household production theory, an economic agent receives also satisfaction from the consumption of leisure which is defined as the time devoted to activities besides work (Sadoulet and de Janvry, 1995). Thus, the household aims at maximizing its utility function by consuming goods, services and leisure, under an income and time constraint. The income constraint indicates that the household's consumption cannot exceed its total income which is income from farming plus off-farming income. This implies that total income is an endogenous variable in the farm/household framework, as it affects the household's consumption. This endogeneity of total income depicts the non-separability of the farm/household. The time constraint illustrates that time devoted to on and off-farm work plus leisure time cannot surpass the household's total endowment of time. The utility maximisation process of the household results in demand functions for goods and services, a demand function for leisure and a supply function for labour destined to farming and off-farming activities. Supply of capital can be modelled by assuming that household expenditure is based on expected budget available for expenditure. The difference between actual household income and expenditure equals savings. Supply of capital equals the initial supply minus capital depreciation plus investments where investments equal savings.

Finally, there are certain assumptions about the farm/household's behaviour which illuminate the scope of its decisions. These assumptions regard the composition of the household and its connection with its environment. More specifically, the farm/household is considered to be a unified entity, which implies that there is no internal conflict regarding the goals of its members. In addition, the farm/household is an optimizing agent and hence its decisions on how to allocate its available resources do not diverge from its aim to maximize its objective functions (Sadoulet and de Janvry, 1995). Further, there is no interaction between different farm/households. This assumption suggests that the farm/household's production and consumption decisions are taken independently, despite the fact that economic behaviour in rural area is closely related between different farms/households (Louhichi et al., 2013).

4.3 Internal factors

Using this framework, the factors which limited the CAP's performance in increasing Greek family farms' income, productivity and competitiveness can be identified and classified in internal and external. Regarding the internal factors, the CAP, as any other policy, influences behaviour and more specifically, affects farmers' production decisions. Since in the farm/household framework production and consumption decisions are interrelated, it is assumed that the CAP's measures influence also the consumption decisions of the farms' households. Thus, by examining Greek farms/households' profit and utility maximization objectives under the CAP's support, it can be clarified whether and how support incentivized them to organize their production and consumption in a way which resulted in the deterioration of their income, productivity and competitiveness. With such an analysis, the

behavioural responses of the Greek farms/households to the adoption of the CAP's measures are identified as the internal factors which affected the CAP's performance.

Regarding the decoupled payments' effects on the farms/households' behaviour, existing literature suggests that it is practically impossible to provide support fully decoupled from production. In fact, in the non-separable farm/household framework the decoupled payments have the potential to affect labour supply, investment and consumption decisions. As far as the labour-distortive effects are concerned, the decoupled payments potentially induce a wealth and a substitution effect on the farms/households' labour supply decision. The wealth effect suggests that as decoupled payments are a source of non-labour income, the farm/household that receives them can enjoy more leisure while maintaining its initial levels of consumption (Ahearn et al., 2006, Key and Roberts, 2009). This implies that the farm/household supplies less labour to on-farm and off-farm activities. Considering that on-farm labour supply affects the farm's production, less labour input decreases output levels and hence, income from farming. The age of the farm/household's members is a determinant for the magnitude of the wealth effect, since older farmers may demand more leisure time to compensate for their higher, relatively to younger farmers, physical fatigue induced by labour (Ruben and Ruiter, 2002). On the other hand, the substitution effect suggests that decoupled payments have the potential to incentivise the members of the farm/household to supply less labour in their farm and more in off-farm activities (Swinnen and Knops, 2013). This is due to the fact that decoupled payments may alter the relative earnings from on-farm and off-farm labour supply. Considering that the decoupled payments are not linked with labour input use in the farm, the farm/household will not receive more support by supplying more labour to its farm. Instead, the support it receives is fixed. In case that the wage the members of the farm/household can receive by working in off-farm activities is higher than the shadow wage of the on-farm labour, they will decide to work less in on-farm activities and more in off-farm activities. Therefore, decoupled payments potentially induce these two effects, which in both cases result in less labour supply to on-farm activities and hence, less output and income from farming. Regarding the investment-distorting effects, the term investment in agriculture refers to physical capital and land accumulation/improvement, as well as to development of human/social capital and natural resource use (Zepeda, 2001). These investments promote a farm's modernisation and have the potentials to increase agricultural production and productivity (CGIAR Consortium, 2012). An increased production affects positively the farmers' incomes through higher output levels. In addition, an increased productivity implies a more efficient utilisation of resources which results in higher output and lower input prices. This efficiency in production promotes a farm's overall competitiveness (OECD, 2011). Considering these, the decoupled payments have the potential to influence on-farm investment decisions and thus, affect the long-term income, productivity and competitiveness prospects of the farmers. More particularly, the decoupled payments shape the income levels of the farm/household and in consequence, its savings. This change in the farm/household's savings levels influences its investment decisions (Peerlings, 2005). Moreover, the decoupled payments reduce the farmer's risk aversion by ensuring a fixed source of income and therefore incentivize them to take risky investment decisions (Vercammen, 2003). In addition, the decoupled payments can serve as collateral for farmers to receive loans from financial institutions to fund their investments. This is the case as decoupled payments are linked to the

land of the beneficiary and hence, increase the land's value and provide increased collateral for the farmers (Connor and Hennessy, 2013). Therefore, financial institutions perceive loans to the beneficiaries of decoupled payments as less risky and thus, are more willing to provide farmers funding for investments. This reduction in the credit constraints that the farmers face has the potential to increase their investments, thus affecting their production decisions (Gallerani et al., 2008). As credit constraints are higher for older farmers and small-medium sized farms, the decoupled payments may have greater effects on their investment decisions (Connor and Hennessy, 2013). Finally, regarding the consumption-distortive effects, the decoupled payments provide a free-from-risk increase in the household's income, which may incentivize it to consume more goods and services (Gallerani et al., 2008). More specifically, the decoupled payments are an extra source of income for the household which relaxes its income constraint (Agrosynergie, 2013). This implies that by receiving this extra income the household can increase its expenditure on goods and services and/or increase its savings. Hence, the household makes decisions on how to allocate this extra income between consumption and savings. Considering that in the household production theory the household's savings represent its investments, there is a trade-off between utility received from the consumption of goods and services and returns on investments. In fact, high potential returns on investments incentivise the household to consume less and invest more (Adams and Singh, 1972). The returns on investments are influenced by a set of different factors. More particularly, they are determined by the quality and functioning of institutions, in terms of their capacity to reduce uncertainty and promote development (Bénassy-Quéré et al., 2007). Furthermore, they are determined by the cooperative level of farmers and more specifically, by their perspectives to collectively mitigate risk (OECD, 2013). Additional determinants of returns on investments in agriculture according to Luyt et al. (2013) is the geographic location of farmers, in terms of the restrictions certain locations impose in achieving economies of scale, due to poor infrastructure and/or other geographical aspects. In addition, the availability of public services and utilities by the state which can promote agricultural production, as well as the state's support in proving incentives for investments through proper taxation. Moreover, the functioning of agricultural markets in terms of the opportunities and limitations they establish in farmers' engagement into market transactions. Finally, the level of management skills of farmers, in terms of their performance in planning, organising and executing beneficial investments. In case the impact of these factors induces relatively small returns on investments, the farmers have low incentives to invest. With low incentives to invest the farm/household chooses to increase its consumption of goods and services and defers investments. In this case, the consumption-distorting effects of the decoupled payments are larger.

Connecting these findings from literature with the case of Greece, this study aims at providing insights on how the CAP's direct payments affected Greek farms/households labour supply, investment and consumption decisions, as well as on how these decisions shaped their income, productivity and competitiveness.

4.4 Data

In this chapter a theoretical and an empirical model are discussed. However, the empirical model is not reflecting the actual situation in Greece. It is a stylised numerical model that shows potential effects but it does not claim to reflect the actual situation. To build an empirical model that would reflect the Greek situation 'real' data are needed. This section describes such data. This section employs data which refer to a Greek specialised olive oil producer and Greek rural households' annual income/expenditure.

Data referring to a specialised olive oil producer are drawn from the EU's report on Greek olive oil farms based on average figures of 2006-2009 FADN surveys on farm level. This dataset is chosen according to representativeness criteria. More particularly, data referring to the production organization of the specialist olive oil farms can yield representative results as this specialization in production allows the allocation of specific costs to each production factor (European Commission, 2012). The degree of specialization refers to the share of the olive oil input to the total output and a farm is identified as specialised when this degree is over 50%. The farms studied by the FADN surveys have a specialisation rate of 79%. Furthermore, specialised olive oil farms are dominant in Greek agriculture and therefore, the study of their production organization can yield representative results for the whole agricultural sector. In addition, olive oil production in Greece is mainly organized under traditional methods (European Commission, 2012), which is also representative for the whole sector's production patterns.

Furthermore, the EU's report on Greek olive oil farms assumes that the farms under investigation complement their low income from farming with off-farm income. Such an assumption is plausible given that only 10% of Greek farmers are full-time farmers (Swinnen and Knops, 2013). In fact, agricultural households' off-farming income in Greece in the majority of cases reaches up to 40% of the households' total income (OECD, 2003, Karanikolas and Zografakis, 2009). However, the off-farm income of the sample's farms is not incorporated in the EU's report on Greek olive oil farms. In order to cope with this limitation and provide a valid and representative analysis of the consumption behaviour of a specialised olive oil farm's household, this study draws total income data from the General Secretariat of Information Systems (GSIS) databases of the Ministry of Finance of Greece. These data refer to the average total income of households with agriculture as the main economic activity, which are located in the same regions that the EU's report on Greek olive oil farms conducted its investigation. These regions are Crete, Pelloponisos, Sterea Ellas, Ipiros and the Aegean and Ionian islands. In all of these regions olive oil production is the dominant type of farming as olive oil farmers account for 54% of all agricultural producers (GAIA, 2012). Findings from the GSIS databases indicate that households located in the aforementioned regions with agriculture as the main economic activity, had for 2006-2009 an average income of 10,408 euro (GSIS, 2015).

Regarding the expenditure data of the specialised olive oil farm's household, EU's report on Greek olive oil farms do not provide any data of the farms' households expenditure. In order to cope with this limitation, this study draws expenditure data from the Household Budget Surveys (HBS) carried out by the Hellenic Statistical Authority (El.Stat.). Due to limited availability of data, this study employs data from the 2008 HBS, as it is the most

representative survey considering the time frame of the EU's report on Greek olive oil farms. Given that certain criteria are satisfied, this study assumes that certain classes of 2008 HBS data are representative for the consumption patterns of the household of a specialised olive oil farm. According to theory, a household's consumption in Greece is determined among others by its geography and income (Sapounas, 1988). Regarding the geographical determinant, the aforementioned regions in which the EU's report on Greek olive oil farms conducted its investigation are characterised according to the Eurostat's Statistical Atlas rural-urban typology as predominantly rural (European Commission, 2014). Considering that consumption patterns are different in rural and urban areas in Greece (El.Stat., 2008), it is plausible to choose the expenditure patterns of rural households. As far as the income determinant is concerned, this study chooses household expenditure data which lie into the class of 9,012-13,200 euro of annual rural household income. Finally, the examination of the consumption of goods and services derived from the farm's production is out of the scope of this study. Therefore, the household's consumption refers only to purchased goods and services from markets.

Table 4.1 presents the data by connecting the framework of the farm/household's organisation with the findings from EU's report on Greek olive oil farms and the GSIS and HBS databases

Table 4.1 Specialised olive oil farm/household data (values in euro)

Revenue	8,145
Direct payments and other support	3,688
Non-factor costs	848
Paid factor cost	900
Normative factor costs	2,678
Income from farming	10,085
Off-farm income	323
Household's savings	1,107
Household's expenditure	9.301

Source: European Commission, 2012, GSIS, 2006-2009, El.Stat., 2008 and own calculations.

In the table above, direct payments and other support consist of decoupled payments, olive coupled subsidy and rural development payments. Decoupled payments according to the EU olive oil farms report account for 91% of the total support that a specialised olive oil farm receives. In addition, the non-factor costs are the aggregate of total operating costs such as the costs imposed by the use of fertilizers, crop protection, water, fuel, energy, building and machinery upkeep, etc. Furthermore, the paid factor costs are the aggregate of hired labour and rented land/capital costs plus the depreciation costs. The normative factor costs are the costs of family labour and family land/capital. According to the EU olive oil farms report, family labour accounts for 93% of the farm's normative factor costs and 56.5% of total costs. This suggests that the farm's production organisation is labour intensive. As existing literature indicates, this pattern is widespread evident for olive oil production in Greece (Giannakas et al., 2000, Tzouvelekas et al., 2001, European Commission, 2012). Moreover, income from farming is revenues plus direct payments and other support minus the sum of non-factor, paid

factor and normative factor costs. Off-farm income is calculated as average agricultural households' income provided by the GSIS databases minus income from farming provided by the EU olive oil farms report.

4.5 Theoretical Model

Based on the household production theory as presented by Sadoulet and de Janvry (1995), a theoretical model is constructed in order to represent the production and consumption organisation of a Greek specialised olive-oil farm/household and thereby, analyse the factors which limited the CAP's performance in Greek agriculture. This model is an integration of the farm's profit maximisation function and the household's utility maximisation function. On the farm's side, the farmer maximises profits under a technology constraint and takes market prices as exogenous (i.e. market constraint). More specifically, the farm produces one output *y* which is olive oil and faces a market price *py*. In addition, the farm utilizes non-factor inputs *x* with price *px*. As this study is not interested in each individual non-factor input's contribution to the production, all non-factor inputs are examined in aggregation. Furthermore, the farm utilizes hired/rented factor inputs denoted as *z* with a shadow price *pz*. These hired/rented factor inputs are an aggregation of the hired labour and the rented land/capital that the farm utilizes which are assumed to be fixed within the timeframe of the model's analysis. Additionally, the farm sources factor inputs from its household denoted as *xl* with shadow price *pl*. These factor inputs are an aggregation of family labour and family land/capital provided to the farm. Considering the scope of this study and the fact that family labour is the most common in Greek olive oil farms (European Commission, 2012), for simplicity reasons the aggregated factor inputs *xl* henceforth will refer to family labour. The shadow price *pl* for labour is determined by the equilibrium in labour demanded by the farm and labour supplied from the household. This shadow price is the marginal gain that the farm receives by employing one extra unit of labour to its production, as well as the marginal gains that the household receives when supplying one extra unit of labour to its farm. Considering all these, the farmer aims at maximizing the profit function:

$$Max_{y,x,xl}\, profit = py * y - px * x - pl * xl$$

subject to:

$g\ (y, x, xl, z) = 0$, which is the farm's production technology.

On the household's side, the household maximises its utility under an income and time constraint. More particularly, the household consumes a vector of goods and services denoted as *xc* with price *pc* and leisure denoted as *xle*. The household's expenditure on these goods and services and its consumption of leisure are determined by an expected level of full income, based on an average level of income it received in the previous years denoted as *m*, which is fixed. Such a dependence on the previous years' income levels depicts the household's rigidity in consumption. More specifically, this study assumes that the specialised

olive-oil farm/household has limited capacity to process information regarding its future income. This assumption is based on the fact that the volatile economic and political status of Greece has an effect on the farm/household's present and future income. As theory suggests, economic agents with limited access to information prefer to reduce their volatility of consumption (Tutino, 2008). Hence, this study's farm/household presumably fixes over the years its consumption levels, based on an average income level it has been receiving in the past years. Moreover, the household's demand for goods and services, as well as for leisure, is a function of a subsistence level of consumption it has to satisfy. More particularly, for the consumption of goods and services there is a subsistence level denoted as *sc*, which determines the level of consumption of goods and services. This subsistence level refers to the minimum amount of goods and services that the household's members have to consume, in order to cover their basic needs. In addition, for the consumption of leisure there is a subsistence level denoted as *sl*, which determines the household's demand for leisure. This subsistence level refers to a minimum amount of hours the household's members have to consume, in order to overcome their daily fatigue.

Therefore, with *pc* denoting the price of the vector of goods and services the household consumes, its expenditure denoted as *Exp* is,

$$Exp = pc*xc.$$

Besides consuming leisure the household also allocates it's time to on-farm labour denoted as *xl* and off-farm labour denoted as *yloff*. For simplicity reasons, this study assumes that all the factors that the household provides to off-farm activities refer to labour. Furthermore, there is a trade-off between the gains from supplying labour to on-farm, to on off-farm activities and from the consumption of leisure. However, this study assumes that off-farm labour supply of the farm/household is fixed, which limits the aforementioned trade-off to gains from labour supplied on-farm and leisure. This assumption is based on the fact that olive oil production is characterised by a biennial cycle which implies that one year of good olive oil harvest is followed by a poor one (Giannakas et al., 2000). This biennial cycle is due to biological factors inherent to the olive tree. Therefore, this biennial cycle of olive oil production results in a normal income from olive oil production in one year and a lower income in the following. In order to cope with such income fluctuation this study assumes that the specialised olive oil farm/household supplies off-farm labour on a regular basis and in a fixed amount. Such a fixed off-farm labour supply enables the household to provide some stability in its income levels and/or compensate for its loss in income during poor harvest years. Therefore, the farm/household supplies off-farm labour denoted as *yloff*, which is fixed and receives an off-farm labour price denoted as *plex*. This off-farm labour price is also fixed as the household is assumed to take market prices as exogenous (i.e. cannot influence market prices). However, the shadow price of on-farm labour and leisure is endogenous, as it is assumed to be influenced by the level of fixed income of the household, of the price of the vector and goods and services the household consumes, of the netput prices and of the quantity of the fixed input. In equilibrium shadow price of on-farm labour and shadow price of leisure are equal. Overall, the household has a total endowment of time denoted as *lab*, which is fixed,

lab =yloff + xl + xle

and by devoting time to off-farm activities the household has an off-farm income denoted as *Incoff*, which is,

Incoff = yloff plex.*

Together the on-farm and off-farm income of the household constitute its full income denoted as *INC*, which is

INC = profit + Incoff – pz z*, where *profit* is the maximum level of profits that the farm achieves.

The difference between this year's full income and its expenditure constitute the household's savings denoted as *Sav*. Therefore,

Sav = INC - Exp, which is the household's savings.

Considering the non-separability of the specialised olive oil farm/household, the household aims at maximizing its utility function denoted as *u*,

$Max_{xc,xle} u(xc, xle)$

subject to,

INC = exp + Sav, which is the household's income constraint
lab =yloff + xl + xle, which is the household's time constraint

The solution of this model yields the following functions:

y = y (py, px, pl, z), which is the output supply function
x = x (py, px, pl, z), which is the non-factor input demand function
xl= xl (py, px, pl, z), which is the on-farm labour demand function
pl = pl (m, pc, py, px, z), which is the shadow price of on-farm labour and leisure
psz = psz (py, px, pl, z), which is the shadow price of the fixed input
profit = profit (py, px, pl, z), which is the farm's profit function
Incoff = Incoff (plex, yloff,), which is the household's off-farm income function
INC = INC (py, px, pl, plex, yloff, z), which is the household's full income function
xc = xc (pl, pc, m), which is the goods and services demand function
xle = xle (pl, pc, m), which is the leisure demand function
Exp = Exp (pl, plex, yloff, pc, m), which is the household's expenditure function
Sav = Sav (pl, plex, yloff, pc, m, py, px, z), which is the household's savings function.

4.6 Expected impact of internal factors

In this section, the CAP's support is introduced into the theoretical model and its impact in the specialised olive oil farm/household's production and consumption decisions is assessed from an empirical perspective. This assessment is based on an empirical model developed by Peerlings (2015) for the purposes of this study, which refers to the production and consumption organisation of the specialised olive oil farm/household. However, the data which are employed in this model do not refer to actual data of a specialised olive oil producer in Greece, but depict indicative arbitrary values relevant to a farm/household's production and consumption. In the empirical model, the profit function of the farm is reflected by a flexible functional form (Chambers, 1988) or more precise the quadratic profit function which is a second order approximation of the true profit function. In this profit function, all prices are normalised. The household's goods and services consumption demand, as well as its leisure consumption demand functions are specified through the Linear Expenditure System (LES), developed by Stone (1954). Finally, the model is simulated under two scenarios. In the first scenario, namely the base run scenario, the farm/household's organisation is depicted in the absence of the CAP's support. In the second scenario, namely the intervention scenario, the CAP's support is introduced into the model and thus, its effect is illustrated on the farm/household's organisation.

The CAP's support is introduced by assuming that the specialised olive oil farm/household receives direct payments. For simplicity reasons and considering that the decoupled payments form the vast majority of the total support that Greek specialised olive-oil farmers receive, this study disregards the impact of the other support measures on the farm's behaviour and regards decoupled payments as the only support that it receives. Therefore, the influence of the decoupled payments on labour supply decisions of the farm/household is assessed in terms of their impact on the on-farm labour supply and on leisure consumption. Furthermore, the effect of the decoupled payments on the investment decisions of the farm/household is assessed in terms of their impact on the savings. In fact, this study assumes that investments are funded entirely by the household's savings. Such an assumption is plausible given that Greek farmers have limited prospects in funding their investments through external sources due to the disadvantaged terms of credit that they face (Oltheten et al., 2004, PASEGES, 2011). Hence, the savings variable of the model refers to the farm/household's investments. Finally, the influence of the decoupled payments on the farm/household's consumption is assessed in terms of their impact on its consumption demand variable.

By receiving decoupled payments, the farm/household increases its income. However, as theory suggests, agents with limitations in processing information tend to modify less their consumption patterns according to shocks in their income levels (Tutino, 2008). Hence, an information-processing-limited farm/household presumable responds to shocks in its income level, in the long-run. In addition, in the farm/household framework the consumption decisions of the household affect its factor supply. Considering these, a shock in the household's income as the introduction of decoupled payments has to be incorporated into a variable that influences the household's decisions in the long-run. For this study's framework such a variable is the fixed income m variable, which as specified above, influence

consumption in the long-run. Thus, in the intervention scenario the fixed income variable is increased by a certain percentage, in order to depict the introduction of the decoupled payments into the model. This percentage is 36% of the current fixed income value, as on average, specialised olive oil producers in Greece receive decoupled payments which account for this percentage of their income from farming (European Commission, 2012).

A detailed depiction of the empirical model and the decoupled payment's effects is presented in Annex. However, a demonstration of the model simulation results relevant to the key variables is shown in Table 4.2

Table 4.2 Internal factors' impact

Variable	Effect after the CAP's support %
m	36
xle	7
xc	31
pl	34
xl	-19
y	-6
profit	-1
INC	-1
Sav	-53

Source: Own calculations

As table 4.2 indicates, the CAP's support had negative effects for the specialised olive oil farm/household. As it is shown, the adoption of decoupled payments resulted in the decrease of its full income, as well as of its savings and thereby, its investments. These effects imply that the CAP's support incentivised the farm/household to organise its production and consumption in a manner which deteriorated its economic viability and its prospects in increasing the farm's productivity and competitiveness. More specifically, by receiving decoupled payments the farm/household chose to increase its time devoted into leisure. Hence, the labour-distortive wealth effect of decoupled payments is present in this study's model. By increasing its leisure consumption the household supplies less labour on-farm. Thus, farm labour becomes scarcer which drives up the shadow price of on-farm labour. Less labour supply on-farm results in reduced olive oil production which in turn, decreases profits from farming. On the other hand, the household chose to increase by a large amount its consumption of goods and services, after the adoption of the decoupled payments. Such an effect can be described by the assumption that the farm/household faces low returns on investments and therefore, has limited incentives to save the extra income it receives and invest it on-farm. With decreased full income, due to less farm profits, and with increased expenditure due to more consumption of goods and services the farm/household reduced significantly its savings. As savings fund investments, it is shown that the CAP's support did not incentivise the farm/household to invest the extra income derived from decoupled payments and hence, increase its productivity and competitiveness.

5. External factors

5.1 Introduction

The purpose of this chapter is to examine the external factors which limited the CAP's performance in Greek agriculture. According to the household production framework presented in the previous chapter, these factors are classified in external as they concern aspects of the environment of the farm/household. These aspects are the transaction costs induced by the institutional environment in Greece and the intra-EU trade implications induced by EU's monetary and trade regime. Therefore, chapter 5 is organised as following: Section 5.2 provides a theoretical framework on transaction costs and institutions and discusses how they influence a policy's implementation, as well as the family farms' participation in markets. Section 5.3 investigates the Greek institutional framework and analyses how it shapes the CAP's implementation and the family farms' participation in markets in Greece. Furthermore, section 5.4 discusses the theory behind the Dutch disease phenomenon, in order to explain how EU's monetary and trade regime influenced the CAP's performance in Greek agriculture. Section 5.5 modifies the farm/household model presented in chapter 4 in order to incorporate the transaction costs and Dutch disease effects on the outcomes of the family farms' participation in markets. Finally, in section 5.6 the decoupled payments that the farm/household receives are introduced into the model and the model simulations' results are presented, which demonstrate the external factors' expected impact.

5.2 Transaction costs, institutions and policy implementation

In the previous chapter, the transaction costs that a family farm faces were perceived as the cause of the farm/household's non-separability. In this section these transaction costs are examined in a broader perspective, in order to investigate their impact on the CAP's implementation in Greece and on the family farms' participation in markets. With this perspective the transaction costs embedded in the Greek family farms' adaptation to the CAP's measures and participation in markets are identified as factors which limited the CAP's performance in Greek agriculture.

Literature suggests that any socio-economic interaction is a transaction which involves the exchange of property rights between agents (Commons, 1931). These transfers of property rights incorporate specific costs which are called transaction costs. These transaction costs refer to the costs of searching for information and negotiating transactions, screening between potential partners, monitoring the behaviour of agents involved in the transactions and finally, safeguarding the transactions' rules (Sadoulet and de Janvry, 1995). In some cases, these transaction costs are so high that they prevent the realisation of their associated interaction, as the expected returns from the interaction are lower than its embedded costs (Coase, 1960). In an alternative narrative, transactions constitute the organization and coordination of every socio-economic interaction (Ridier et. al., 2008). Hence, transaction costs in this perspective are the costs of organizing and coordinating socio-economic interactions. If transaction costs embedded in the organization and coordination of a socio-economic interaction are too high, it is not profitable for an agent to proceed in such organization or coordination. This implies

that the socio-economic interaction will be unorganized and uncoordinated. Thus, the socio-economic interaction will not yield optimal results or even will not produce any result at all.

Regarding the causes of the aforementioned transaction costs, the notion of bounded rationality clarifies their existence. More particularly, it is perceived that agents and individuals are bounded rationally (Simon, 1972). This notion indicates that when individuals make decisions and take actions they suffer by their limited available information, their limited cognitive knowledge and their limited available time. All these restrict their ability to proceed in the proper decisions and actions in order to fully address their needs and goals. All attempts to overcome these limitations entail costs, which are the aforementioned transaction costs. Additionally to the bounded rationality notion, the rent-seeking assumption also implicates costs of conducting a transaction (Williamson, 1979). To illustrate, in an agreement/partnership agents may have incentives to disclosure information partly or entirely regarding their intentions or actions. Throughout such behaviour they might achieve higher gains than behaving according to imposed rules. This morally and legislatively inappropriate behaviour raises transaction costs, due to the fact that all parties of the agreement must invest in safeguarding their interests against opportunistic behaviours. Moreover, the more complex an interaction is the more individuals will be involved in it. Hence in this case, the individuals' costs of acquiring information about each other decisions and actions, as well as controlling and organizing each other will be greater (North, 1992). This implies that bounded rationality and opportunistic behaviour impact progressively transaction costs as complexity in socio-economic interactions increases. Thus, more complex interactions entail greater transaction costs for all parties involved in them.

As transactions take place within a certain environment, the costs that they entail and hence, their outcomes are shaped by this environment. This environment consists of institutions, which according to Douglas North (1990) are the set of rules and regulations, norms of behaviour and the enforcement mechanisms which characterise a society. Within this setting economic agents pursue their goals-preferences under the opportunities as well as the restrictions that institutions impose upon them (North, 1990). Moreover, institutions can also be perceived as systems or organizations which arise by the need of structuring and governing various interactions within human societies (Hodgson, 1998). Altogether, these rules, norms and mechanisms, as well as organizations and governance structures are perceived as a society's institutional environment. This environment affects economic performance by determining the level of transaction costs which take place within its context (North, 1992). Efficient institutions enable low transaction costs which results in the achievement of transactions with an optimal cost-benefit trade off. On the other hand, low quality institutions with poor governance raise serious obstacles in socio-economic interactions. These obstacles are articulated in high transaction costs.

A policy's implementation can be perceived as a complex socio-economic interaction which entails transaction costs. In this context imperfect information and rent-seeking behaviour are the main impediments of a policy's success. In fact, costs associated with acquiring the required information regarding aspects of a policy and the costs of enforcing and safeguarding its rules and regulations, are often significantly high (North, 1990). Considering the CAP's implementation as a complex socio-economic interaction between multiple stakeholders, the following transaction costs can be identified: Costs which affect the

state and/or public agencies. These are the costs of implementing and evaluating the CAP, as well as costs of supervising and monitoring farmers' actions and safeguarding the payments of contracts (Falconer and Whitby, 1999). In addition, there are costs which affect the farmers. These are the costs related to searching for information regarding the CAP's contracts and regulations, costs related to the administrative procedures for handlings and negotiating the contracts and costs related to the implementation of the imposed by the CAP agreements and compliance with the CAP's changing standards (Van Huylenbroeck et al., 2005). Connecting the case of the CAP with the impact of institutions in its implementation, effective institutions have the potential to lower the transaction costs that the state and public agencies face in administering the policy. In addition, high quality institutions lower the transaction cost that the farmers' face in adapting to the policy's measures. In this case, the CAP's implementation is beneficial for the agricultural sector. On the other hand, inefficient institutions raise high transaction costs in administering the CAP's implementation and adapting to its measures. In this case, the CAP's implementation has poor results for the agricultural sector.

The family farms' participation in markets can be also perceived as a socio-economic interaction which entails transaction costs. As discussed in the previous chapter, family farms often face high transportation costs in selling their products to local markets, as well as in purchasing their inputs and supplying labour off-farm. In addition, family farms are bounded rationally in terms of their capacities to access information on inputs in their production process, as well as on agreements which could benefit their revenues. This bounded rationally is closely correlated to the age and education level of the family farms' members. More particularly, older farmers with low education levels face high costs in accessing information that can promote their marketing prospects. Further, family farms are most frequently small in size and in many cases do not engage in cooperative action. Due to these, they have limited ability to bargain their selling prices, as well as to purchase inputs in beneficial terms. Their weakness in bargaining is amplified in cases when the markets that they participate are characterised by imperfect competition and oligopolistic structures. Thus, in their efforts to achieve beneficial prices and agreements, the family farms face high costs (Louhichi et al., 2013). All these transaction costs affect the family farms' economic performance by inducing disadvantageous selling prices for their outputs and purchasing prices for their inputs. More specifically, these transaction costs lower the price for which the farms sell their products, while they raise the price for which they purchase their inputs. The lower effective prices that the family farms face in selling their outputs, reduce their revenue prospects. In addition, the higher input price that they pay for purchasing their inputs increases their production costs. Therefore, the lower revenues along with the higher costs decrease their income from farming. Finally, by facing transaction costs in supplying labour to off-farm activities, the family farms also face a decreased income derived from off-farm activities.

5.3 Institutions and transaction costs in Greece

The institutional framework in Greece is often characterized by weak quality and poor performance. Indicative for this, are the results of the study conducted by Boewer, Michou and Ungerer (2014) which assessed institutional performance in Greece according to four

institutional quality indicators and concluded that Greek institutions' performance is quite low. Table 5.1 presents Greece's scores on main indicators of institutional-quality, related to EU and OECD countries average performance..

Table 5.1 Institutional quality in Greece

Indicator[1]	Greece	EU/OECD countries
World Economic Forum; Global Competitiveness Indicator subcomponents, 2013-2014		
Institutions	49	69
Infrastructure	68	77
Education	67	75
Goods market	55	67
Labour market	43	79
Financial market	65	80
Technology & FDI	63	77
Market size	60	63
Business sophistication	55	64
Innovation	49	62
World Bank Doing Business Report; Distance to Frontier Indicator subcomponents, 2014		
Starting a Business	89	91
Registering Property	45	79
Getting Credit	56	72
Protecting Investors	53	60
Paying Taxes	75	75
Trading Across Borders	75	84
Enforcing Contracts	40	71
Resolving Insolvency	38	72
World Bank; Worldwide Governance Indicator subcomponents, 2012		
Political Stability	35	70
Government Effectiveness	61	84
Regulatory Quality	65	83
Rule of Law	62	84
Control of Corruption	49	80
OECD: Sustainable Governance Indicator subcomponents, 2011		
Electoral Process	75	81
Access to Information	58	75
Rule of Law	41	72
Economy and Employment	31	60
Resources	32	57

Note 1: Values of indicators are rescaled to 100

Source: Boewer et al., 2014

It can be concluded from table 5.1 that institutions in Greece do not favour a policy's successful implementation or the proper governing of market transactions. In fact, the low scores on some specific indicators imply that transaction costs related to policy

implementation and market participation can be high in Greece. These indicators are Institutions, Enforcing Contracts, Goods Market, Political Stability, Control of Corruption, Access to Information, and Rule of Law. This poor institutional performance in Greece suggests that the CAP's implementation in Greece and the family farms' participation in markets entail high transaction costs.

Regarding the transaction costs embedded in the CAP's implementation in Greece, the aforementioned poor institutional performance induces high transaction costs for the state to administer the policy and for the farmers to adapt to the policy measures. More particularly, the administrative environment of Greece, the country's research and educational institutes along with the Greek agriculture's human capital status and cooperatives, limit the CAP's potentials in promoting the sector's income, productivity and competitiveness. Regarding the administrative institutional environment in Greece, it is characterized by complexity in governance and high degree of centralization (OECD, 2005). In addition, policy regulations come with serious limitations as the legislative framework is frequently confusing and contradictive (NL Embassy, 2012). In case of the agricultural sector, its administration is characterised by serious inflexibility (Papadopoulou et. al., 2010). All these administrative characteristics have serious potential in increasing transaction costs related to the CAP's implementation and its regulations' enforcement, as well as to the supervision and monitoring of farmers' action. One example of high transaction costs embedded in the CAP's implementation in Greece is the case of the Investment Aid scheme. The implementation of this scheme was delegated to official agronomists at prefectural level which according to the schemes' function were not accountable for their administrative actions to any official agency or body. Therefore, transaction costs associated with monitoring and evaluating the schemes' implementation were high for the state, causing an ambiguous connection between the schemes' aims and results (Karanikolas and Martinos, 2007). Another example of the negative impact that the complex administration in Greek agriculture imposes on its farmers, is that administrative bureaucracy disincentived Greek farmers to certify their products and thereby, increase their competitiveness in international markets. Despite the fact that the CAP explicitly provided incentives to Greek farmers to acquire quality certification for their products, the high transaction costs embedded in the relevant actions restricted them from proceeding in such transactions (Dimara et al., 2004). As far as the research and educational institutes in Greece are concerned, they fail in many cases to provide essential knowledge and information to both the state and the farmers, as well as to introduce innovations in Greek agricultural production (NL Embassy, 2012). As a result, Greek farmers face significantly high costs in acquiring information and knowledge regarding opportunities for modernizing their production or participation in the CAP's schemes. Regarding the human capital status of Greek agriculture, the farmers' bounded rationality restricts their prospects in adapting to the CAP's measures. More specifically, the average high age and low educational level of Greek farmers imposes high transaction costs in their efforts to access and analyse information regarding the CAP's measures and its changing standards (Aggelopoulos et. al., 2011). This bounded rationality in combination with the lack of adequate institutions to support farmers' efforts in adapting to the CAP's measures alienated Greek farmers from processes which could promote the modernization of their production and adjustment to the imperatives of the international competition. Finally, regarding cooperative action in Greece, the CAP's

subsidies along with protectionism from the central government created a feeling of economic stability for Greek farmers and supported the belief that cooperation is not necessary (Bourdaras, 2008). For example, only 13% of farmers are organized in cooperatives (Kagkou, 2008). This pattern can be also explained by the fact that agricultural cooperatives in Greece did not emerge from the demand of farmers for better bargaining power, but they were instituted by the central governmental as a mean for policy implementation (Patronis and Mavreas 2004). Moreover, this non-cooperative attitude is also due to the fact that agricultural cooperatives in Greece are often characterized by poor organization and management (NL Embassy, 2012), by opportunistic and rent-seeking behaviour on behalf of their members (Iliopoulos, 2012) and by passive membership-behaviour (Patronis and Mavreas, 2004). As the Greek state utilizes agricultural cooperatives as the main channel for the provision of bank loans to farmers and the monitoring mechanism of economic activities in rural areas (Patronis and Mavreas, 2004), their low institutional quality raises the transaction costs embedded in the provision of these services. These costs are in particularly costs associated with the monitoring of their activities, with the enforcement of the state's and the CAP's regulations, with the implementation of safeguarding measures against opportunistic behaviour and with their overall governance and administration. Therefore, agricultural policies in Greece channelled through the agricultural cooperatives face high transaction costs in their implementation which in many cases induce disconnection between planning and outcomes. Furthermore, Greek farmers due to their aforementioned bounded rationality have to rely on collective action to exploit fully the benefits of the CAP. The institutional quality however of their representative bodies raises the costs of acquiring information on policy measures. As a result, Greek farmers abstain from a clear market orientation (Pezaros, 2001).

Regarding the transaction costs embedded in farmers' participation in markets, the low-quality institutional environment of Greece favours the existence of market imperfections which impose low effective selling prices for agricultural outputs and high effective purchasing prices for agricultural inputs. Regarding the effective selling prices of outputs, the small in size and non-organized Greek farms possess limited bargaining power. Hence, in their efforts to bargain for prices or promote their production, Greek farmers face high transaction costs. Furthermore, institutions in Greece lack the ability to tackle market imperfections caused by the high level of concentration in the retail market, the high number of intermediaries involved in the supply chain and the existence of business practices which hinder competition. These market imperfections result in chronic low effective selling prices for agricultural producers (PASEGES, 2011). An example of these market imperfections is the low effective selling prices that the Greek olive oil producers face, as the small size of olive oil farms along with the poor performance of their cooperatives and the dominant presence of large retail chains limit significantly their bargaining power (Vlontzos and Duquenne, 2008, European Commission, 2012). As far as the effective purchasing prices of inputs is concerned, institutions in Greece have limited capacity in resolving the market imperfections caused by the oligopolistic structure of the market of agricultural inputs (OECD, 2005). Hence, the existence of these market imperfections along with the fact that the majority of agricultural inputs are imported (PASEGES, 2011), induce high farm-input prices.

5.4 Dutch disease in Greek agriculture

This section analyses how EU's monetary and trade regime limited the CAP's prospects in increasing Greek farmers' competitiveness. This limitation in the CAP's performance is studied under the theoretical framework of the Dutch disease phenomenon. Under this perspective, the Dutch disease effects in Greek agriculture are identified as the intra-EU trade factor which limited the CAP's performance in Greek agriculture most.

The term Dutch disease was coined by the Economist magazine in 1977, for describing the adverse effects that the discovery of large quantities of natural gas had on the Dutch economy. The Dutch disease narrative explains how massive exploration and exports of natural resources by a country leads to a significant decrease in competitiveness of the country's other sectors such as manufacturing and agriculture. According to the theory behind the Dutch disease phenomenon, a significant increase in a country's exports leads to an increase in its revenues. This increase in revenues drives the national currency's appreciation and hence, the appreciation of its real exchange rate (RER). As the appreciated RER increases domestic prices, the country's other exporting sectors decrease in competitiveness and therefore, are forced to decline their production (Corden and Neary, 1982). In most cases, the sector which is greatly affected by this increase in domestic prices is agriculture (Sadoulet and de Janvry, 1995).

In the case of Greece, it is assumed that its economy and in particular its agricultural sector experienced the symptoms of Dutch Disease. The manifestation of the Dutch disease in Greece however was due to causes other than the exploration of natural resources, while the symptoms of the phenomenon remained the same. These symptoms of the Dutch disease phenomenon, namely the decrease in agriculture's competitiveness, are captured by the deterioration of the agricultural balance of trade of Greece. As the term Dutch disease is closely related to the concepts of competitiveness and the RER, it is useful to provide a theoretical framework of these terms which they will be utilized further in the analysis.

Competitiveness is perceived as the capacity of a country to produce goods and services which meet the requirements of the international markets, thus allowing it to sustain and expand its real income (Haque, 1995). In that sense, competitiveness is achieved by exploiting sources which offer comparative advantage (Farole et al., 2010) and allow a country to sell its goods in global markets, under a free-trade regime (OECD, 2005). For this study's analysis, a country's competitiveness is assessed according to the indicators of productivity and RER.

Productivity is a widely accepted indicator for a country's competitiveness (European Commission, 2009, Farole et. al., 2010, Latruffe, 2010). Productivity is defined as the ratio between outputs and inputs of production. Productivity indicates how efficiently inputs are employed in the production of an output and is a key source of competitiveness and economic growth (OECD, 2015). More particularly, productivity is a major determinant for the rates of return on investments and hence in the long-run, productivity determines the level of economic growth (Porter, 1990). Countries, sectors and individual firms which can achieve a high productivity level and thus economic growth can sustain in competitive markets and increase their market share. On the contrary, failing to achieve a high productivity and economic growth results in exit from competitive markets (Melitz, 2003).

In the case of Greek agriculture's productivity, significant differences exist among Greek farmers in regional and interregional level (Polyzos and Arabatzis, 2005). However, it is evident that the sector in overall is characterized by a non-intensive pattern in production due to the dominance of small-scale farming (Karaganis and Tassoulis, 2006, Hellenic Ministry of Rural Development and Food, 2007). More specifically, the small-scale of Greek farms limit their capacity for savings and thus, financing investments and modernizing production in the scope of increasing productivity (Aggelopoulos et al., 2011). In addition, the fragmentation of the agricultural land limits the efficient utilization of agricultural machinery and capital as a whole and furthermore, Greek farmers utilize on average relative old, unproductive and costly machinery (Ventouris and Tsakanikas, 2011). Moreover, high input prices in combination with the fact that Greek farmers, due to their non-cooperative attitude, fail to achieve economies of scale in their production (Iliopoulos, 2012), result in high production costs. All these affect negatively the productivity of Greek agriculture. Following, table 5.2 provides the Total Factor Productivity (TFP) growth in EU's agriculture by country. TFP is defined as the ratio of the index of the sector's total output to the index of its total inputs (OECD, 2011).

Table 5.2 TFP growth in EU's agriculture
(100 = 1992)

	2007	2008	2009	2010	2011
Austria	143	181	177	153	159
Belgium-Luxembourg	118	138	133	131	128
Denmark	167	199	190	186	191
Finland	98	116	111	106	112
France	125	151	149	136	150
Germany	138	170	162	149	159
Iceland	124	140	140	143	146
Ireland	133	140	125	131	138
Netherlands	134	147	158	160	167
Norway	111	140	139	128	125
Sweden	118	136	131	129	133
United Kingdom	104	111	108	109	109
Cyprus	131	137	151	152	159
Greece	132	141	132	128	134
Italy	152	170	170	176	179
Malta	156	175	173	179	164
Portugal	141	161	162	162	165
Spain	142	176	162	154	162

Source: USDA, 2015

The table above illustrates that Greece had a rather modest productivity growth in the past years compared to major exporting countries as Germany, Netherlands, France, Spain and Italy.

The RER is also an indicator of a country's or sector's competitiveness (Baldwin et. al., 2006). As the RER indicator incorporates the notion of Nominal Exchange Rate (NER), it can be useful to clarify first the latter's definition. The NER is defined as the price of one unit of a foreign currency in terms of the price of one unit of the domestic currency. Under this scope, an appreciation of the NER is when the value of the local currency increases relative to the value of the foreign currency. On the other hand, depreciation of the NER is when the value of the local currency decreases relatively to the value of the foreign currency. Devaluations and revaluations of a currency are instituted by governments in free exchange rate systems. Furthermore, the RER is equal to the NER times the ratio of the prices of a domestic basket of goods to the prices of a foreign basket of goods. Appreciation of the RER decreases a sector's or a country's international competitiveness, as its goods become relatively more expensive. Consequently, depreciation of the RER increases competitiveness as it constitutes domestic goods more cheap in international markets (Sadoulet and de Janvry, 1995).

Greece before the single-currency-implementation in the Euro zone had a weak currency compared to the rest EU member states, namely the Drachma. Table 5.3 presents the exchange rates between former EU members' national currencies in terms of euro, right before the implementation of the single currency.

Table 5.3 Exchange rates euro/local currency unit in 2001

Austrian schilling	13.76
Belgian franc	40.34
Cyprus pound	0.58
German mark	1.96
Estonian Kroon	15.65
Spanish peseta	166.39
Finnish markka	5.95
French franc	6.56
Greek drachma	340.75
Irish pound	0.79
Italian lira	1,936.27
Lithuanian litas	3.58
Luxembourg franc	40.34
Latvian lats	0.56
Maltese lira	0.40
Dutch guilder	2.20
Portuguese escudo	200.48
Slovenian tolar	217.98
Slovak koruna	43.30

Source: European Commission, 2001

As table 5.3 indicates, Greece had a comparative advantage in exports before the single currency implementation, as its domestic goods where relatively cheap in the EU's markets. Greece in the pre-euro era used to devaluate its national currency and hence, increase throughout this policy intervention tool its exporting competitiveness (Papanikos, 2015). However, when EU established a single currency within its zone, competitive advantages deriving from differences between individual member states' RERs were eliminated.

Furthermore, devaluation of a country's currency is no longer possible within EU's single currency regime. In case of Greece and its agriculture, it is assumed that this single currency implementation imposed the symptoms of Dutch disease in its economy. More particularly, Greece with its entry to the Eurozone adapted a stronger than the drachma currency, namely the euro. This was the cause of an implicit appreciation in the country's RER which decreased Greek agriculture's competitiveness within EU markets. In addition, the single currency regime offered Greece the advantages of being member of a stable and strong currency union, namely the benefits of borrowing with lower compared to the pre-euro era interest rates and the liberalisation of capital inflows. However, these advantages had negative implications for the competitiveness of Greek economy in the long-run. More specifically, the increased governmental loans and capital inflows boosted domestic demand. This boost in domestic demand in combination with the structural deficiencies of the Greek economy caused a significant increase in domestic prices and hence, a decrease in the national's economy price competitiveness compared to the rest EU member states. In fact, for the period 1999-2007 domestic prices in Greece increased by 32.8% (Kotios et al., 2011).

Within the single currency regime, Greece can no longer devaluate its national currency and hence increase its agriculture's capacity in competing at the low levels of prices induced by EU's free trade competition. By losing the monetary policy tool of devaluation and by facing low productivity, Greek agriculture's competitiveness and sustainability face serious threats. More specifically, the low productivity of Greek agriculture hinders its potentials in achieving economic growth and thus, realise economies of scale. Without realising economies of scale while facing high production costs due to high input prices, Greek farmers are not able to produce at low prices and therefore, compete within EU's free-trade regime with more cost-efficient farmers. Moreover, as EU's trade regime establishes one single market within EU borders, Greek farmers gradually lose their domestic and EU market share, as they are displaced by more competitive farmers. In the long-run, this loss in their market share affects negatively their income and their economic viability.

5.5 Model and external factors

In this section, the empirical model of the specialised olive oil farm/household is modified in order to incorporate the external factors' effects on the family farm's income, productivity and competitiveness under the CAP's present and future support. First, the model is modified by incorporating the transaction costs' impact on the output/input prices and the off-farm price of labour. Subsequently, in order to incorporate the Dutch disease effects the model prices are adjusted depicting the implicit appreciation caused by the single currency implementation in Greece.

In the presence of the transaction costs, the effective price that the farm sells its output denoted as *pyt* is the market price denoted as *py* minus the value of transaction denoted as *t1* (Key et al., 2000). Hence,

$$pyt = py - t1$$

Additionally, the effective price that the farm buys its inputs is denoted as pxt which equals the market price denoted as *px* plus the value of transaction costs *t2*. Therefore,

$$pxt = px - t2$$

Furthermore, due to the presence of transaction cost, when the household supplies off-farm labour it receives an effective wage denoted as *plext* which is,

$$plext = plex - t3$$

In the presence of the Dutch disease phenomenon the world market prices in terms of the local currency have decreased (i.e. appreciation). Given that Greece exports olive oil and imports most inputs for olive production this implies that netput prices decrease.

5.6 Expected impact of external factors

Incorporating the decoupled payments into the empirical model and simulating it under a base run and two intervention scenarios, enables to provide insights into how transaction costs and the Dutch disease phenomenon affected the specialised olive oil farm/household's income productivity and competitiveness, under the CAP's regime. The base run scenario refers to the farm/household's organisation under the decoupled payments support, in the absence of transaction costs and the Dutch disease phenomenon. The first intervention scenario refers to the farm/household's organisation under the decoupled payments support in the presence of transaction costs. In this scenario all the transaction costs' values are chosen to increase/decrease the price accordingly by an arbitrary percentage of 20%. The second intervention scenario refers to the farm/household's organisation under the decoupled payments support in the presence of the Dutch disease phenomenon. In this scenario the netput prices are also decreased by an arbitrary percentage of 20%. Furthermore, in accordance with the previous chapter, the decoupled payments are incorporated into the fixed income variable, by increasing this variable by 36%. A detailed depiction of the empirical model and the transaction costs and Dutch disease effects on the specialised olive oil farm/household's income, productivity and competitiveness is presented in Annex.

Regarding the results of the model simulations of the first intervention scenario, table 5.4 presents the transaction costs effects on key variables of the specialised olive oil farm/household's organisation.

Table 5.4 Transaction costs effects

Variable	Effect %
py	-20
px	20
plex	-20
pl	-13
xl	-46
y	-14
profit	-31
Incoff	-20
xle	12
xc	1
INC	-31
Sav	-178

Source: Own calculations

As the table above illustrates, the presence of transaction costs under the CAP's support has serious implications for the farm/household's economic viability, as well as its productivity and competitiveness. More specifically, by lowering the price of the farm's output and increasing the price of variable inputs, the transaction costs make farming less profitable. This results in a reduced farm labour demand and thereby, a decreased shadow price of on-farm labour. By making farming less profitable, the transaction costs disincentivise the household also to supply labour on-farm and thus, reduce on-farm labour supply. With less labour supplied on-farm the farm's production decreases. This effect in combination with the reduced output price and the increased variable input costs result in the deterioration of the farm's profits. Furthermore, the transaction costs reduce the external price of off-farm labour and therefore, decrease off-farm income. Less profits and reduced off-farm income result in a substantial decrease in the farm/household's full income. On the other hand, the transaction costs induce a marginal increase in the demand for goods and services. This counterintuitive effect can be described by the fact that the household's members have more time available to spend on recreational activities, due to their overall decrease of labour supply. Overall, by decreasing full income and by marginally increasing expenditure, the transaction costs reduce to a great extend the household's savings. Thus, the farm/household's investments are negatively affected, which limits significantly the farm's prospects in increasing productivity and competitiveness through the modernisation of its production.

Regarding the results of the model simulations of the second intervention scenario, table 5.5 presents the Dutch disease effects on key variables of the specialised olive oil farm/household's organisation.

Table 5.5 Dutch disease effects

Variable	Effect %
py	-20
px	-20
pl	-4
xl	-15
y	-13
profit	-12
xle	4
xc	0
INC	-11
Sav	-63

Source: Own calculations

According to the table above, the Dutch disease phenomenon had significantly negative effects for the farm/household's economic viability and its prospects in increasing its productivity and competitiveness. More particularly, the decrease in output prices constitute farming less profitable and therefore, less attractive. This results in a decrease in farm labour demand. With decreased farm labour demand the shadow price of on-farm labour decreases. As farming becomes less attractive, the household has fewer incentives to provide labour to its farm's production. Thus, on-farm labour supply decreases. Hence, the farm's production is reduced. With fewer incentives to supply on-farm labour and with fixed off-farm labour supply, the household's demand for leisure increases. Furthermore, the decrease in imported input price results in less production costs for the farm. However, olive-oil production does not require significant amounts of variable input. Hence, any fluctuations in variable input prices have small effects on the farm's costs and therefore its profits. With decreased production and with insignificant reduction in variable input costs the farm's revenues decrease and therefore, its profits deteriorate. With decreased profits from farming and with off-farm labour supply fixed, the farm/household's full income decreases. This effect illustrates that the Dutch disease phenomenon has a negative impact on the farm/household's economic viability. Moreover, the decrease in the world market prices make exports less attractive, since exporting olive-oil entails more costs (i.e. transaction costs) than selling it on domestic markets. Therefore, the specialised olive-oil farm limits its perspective only to domestic markets and does not has incentives to integrate into international markets.. With less full income due to decreased profits from farming and with expenditure remaining constant, the household's savings decrease. This affect's the farm/household's prospects in funding investments through savings. With less potential to invest the farm has significantly limited capacities to modernise its production and thereby, increase its productivity. Therefore, the farm's competitiveness is at stake.

6. Conclusions

As presented in this study, the agricultural sector in Greece has significant importance for the national economy. More specifically, agriculture in Greece provides income and employment in rural areas, as well as contributes significantly to the country's exports. However, this study concludes that despite the fact that Greek agriculture received considerable support through the CAP, the sector's economic performance is rather poor. More particularly, the CAP in Greece aimed at supporting farmers' income mainly through the provision of decoupled payments, as well as at enhancing the economic sustainability of rural areas and the competitiveness of the whole sector through the implementation of rural development programs. However, as this study indicates, the provision of decoupled payments did not result in an increase of Greek agriculture's income, productivity and competitiveness. For the effectiveness of the other instruments more research is needed.

In order to analyse the causes of such a poor performance, this study utilizes a non-separable framework of the farm and the farm's households and in doing so, provides insights into the factor's which limited the CAP's performance in Greek agriculture. By classifying these factors in internal and external this study's analysis shows that both of these factors have negative impact on the Greek farms/households. The fact that family farms described by this farm/household framework are dominant in Greek agriculture allows to aggregate such a finding for the whole sector and conclude that under the CAP's support, the internal and external factors have a negative impact for the whole Greek agriculture.

As far as the internal factors' impact on the Greek farms is concerned, this study concludes that the adaption of decoupled payments incentivised them to organise their production in a way which resulted in the deterioration of their income, productivity and competitiveness. More particularly, the decoupled payments incentive the farms to utilize less labour in their production and in doing so, their income from farming decreased. As existing literature indicates, on-farm labour supply has decreased significantly over the years of the implementation of the CAP's subsidies in Greece (Swinnen and Knops, 2013). In addition, the decoupled payments incentivised the farms/households to increase their consumption and not utilize this extra income to fund investments and thereby, increase their productivity and competitiveness. A similar study by Nikolaidis (2004) indicates that the extra income that Greek farmers received through the CAP's subsides, was widely spend on consumption and other non-agricultural activities, rather invested in agriculture. Such findings indicate that in the case of Greece, there is a considerable disconnection between the CAP's goals for reinforcing the farms' income, as well as for increasing competitiveness of agriculture and its actual outcomes. This finding raises crucial policy implications by illustrating the need for a more effective policy-intervention for the agricultural sector in Greece. More specifically, a reduction in the amount of decoupled payments that Greek farmers receive may incentivise them to supply more labour on-farm and thereby, increase their income from farming. In addition, a more efficient institutional framework may increase the returns on investments in agriculture and in doing so, incentivise Greek farmers to invest the extra income they receive through the decoupled payments, rather than spend it on their household's consumption of goods and services.

Furthermore, this study concludes that transaction costs under the CAP's regime have negative effects on the farms' income, productivity and competitiveness. More specifically, the institutional environment in Greece raises significant transaction costs in the CAP's implementation. Therefore, there is a disconnection between the policy's goals and its outcomes, as the policy is poorly implemented. This implies that the CAP has limited performance in increasing Greek farmer's income, productivity and competitiveness. A relevant study which examines the implementation of the CAP's rural development programs (Papadopoulou et. al., 2010), which explicitly aimed at promoting Greek farmers' income, productivity and competitiveness, identifies that the Greek politico-administrative system imposed serious limitations in the implementation and the outcomes of these programs. Furthermore, the transaction costs that the Greek farmers face in selling their outputs and acquiring their inputs deteriorate their income and thereby, their ability to fund investments for increasing their productivity and competitiveness. In fact, as existing literature suggests the low effective output prices and the high effective input prices that Greek farmers face are major drawbacks for the Greek agricultural productions (PASEGES, 2011). In addition, the transaction costs that the family farms face in supplying labour off-farm have negative implications for their full income. A relevant study on Greek farm's pluriactivity (Daskalopoulou and Petrou, 2002), indicates that rural areas in Greece provide limited off-farm employment and income opportunities. This implies that pursuing off-farm employment entails high transaction costs for the family farms, which impacts negatively their off-farm income. Such findings indicate considerable policy implications, since they demonstrate the need for effective policy-interventions in order to enable the development of an institutional framework which will facilitate the CAP's implementation, as well as will promote the Greek family farm's prospects in selling their outputs, buying their inputs and suppling off-farm labour.

Regarding the entrance of Greece in the euro zone the research shows that this has led to Dutch disease effects. This study concludes that the single currency implementation had a negative impact on the Greek farms' income, productivity and competitiveness. More specifically, the single currency implementation limited the Greek farm's income, as well as their capacities in funding investments for increasing their competitiveness. Regarding Greek agriculture's competitiveness, existing literature suggest that since 2000 the sector has witnessed a significant loss in its competitiveness (Malliaropulos, 2010). Additionally, the single currency implementation provided disincentives to Greek farms to engage in exports, which constituted them less motivated to integrate into international markets. Existing literature suggests that this single (domestic) market orientation is particularly evident for the olive-oil sub-sector (OECD, 2005, Vlontzos and Duquenne, 2008). Considering the ever increasing globalised economic environment, the latter finding raises the need for policy-interventions which will provide incentives to Greek farmers to re-orient their production towards a more international scope.

However, this study's analysis entails certain limitations which narrow its perspective. More specifically, the empirical model which is utilised by this study is a stylized numerical model which does not reflect the actual production and consumption organisation of a Greek farm/household. By employing arbitrary data this empirical model identifies the direction of each effect caused by the internal and external factors but does not provide representative

information on each effects' magnitude. Although, a further study can develop an empirical model for analysing the actual production and consumption organisation of Greek family farms under the CAP's support, by utilising the actual Greek specialised olive-oil farm/household data presented in chapter 4. In addition, the empirical model utilised by this study refers to the production of one of the three dominant farm-types in Greece, namely the olive oil producers. Hence, this study narrows its analysis on this type of production and thus, may not provide representative insights into the internal/external factors' impact on the production of the other two dominant farm-types in Greece, namely the cotton and fruits and vegetables producers. Furthermore, the empirical model employed by this study has a static perspective and thereby, does not examine the dynamic effects of each factor over the years of the CAP's implementation in Greece. This implies that the findings of this study's analysis refer to a moment in time right after the adaption of the CAP's support, as well as the family farms' participation in markets and the single currency implementation. Hence, this study does not analyses if and how Greek family farms coped with the limitations that imperfect agricultural markets and the single currency regime imposed upon their economic performance. Moreover, this study regards the CAP's support as if it consists only of decoupled payments. Thus, the internal factors' impact on the farms' income, productively and competitiveness does not examine separately the coupled payments' and rural development programs' impact.

Closing, all the aforementioned negative effects of the internal and external factors' on Greek farms bear significant weight considering the future perspectives of the CAP. More specifically, the future CAP is moving to the provision of reduced payments, through the implementation of the flat-rate payment regime. With reduced support from the CAP and by relying heavily on this support, it is uncertain whether Greek farms can sustain economically within an environment which is characterized by poor institutional quality and increasing international competition. These future perspectives of the Greek farms need to be further investigated, in order to assess if and how the provision of flat-rate payments will have an impact on the Greek farms' economic viability and competitiveness.

ANNEX

Specialised olive oil farm/household model

Symbol	Meaning
py	price output
px	price variable input
pl	shadow price of on-farm labour and leisure
plex	price of off-farm labour
z	quantity fixed input
sl	subsistence demand leisure
sc	subsistence demand consumer goods and services
pz	external price fixed input
psz	shadow price fixed input
y	output
x	variable input demand
xl	on-farm labour demand
xle	demand leisure
xc	consumer demand
yloff	off-farm labour supply
lab	total labour endowment
INC	income
m	fixed income budget available for consumer and leisure demand
Exp	consumer expenditure
Sav	savings
Incoff	off-farm labour income

Functions

Profit

Variables	Coefficients	Values
intercept	a0	5
py	a1	4
px	a2	-6
pl	a3	-4
z	a4	10
py*py	a5	6
px*px	a6	2
pl*pl	a7	2
z*z	a8	-4
py*px	a9	-1
py*pl	a10	-4
py*z	a11	4
px*pl	a12	2
px*z	a13	-5
pl*z	a14	2

Supply function y

Variables	Coefficients	Values
intercept	b0	4
py	b1	12
px	b2	-1
pl	b3	-4
z	b4	4

Demand function xl

Variables	Coefficients	Values
intercept	d0	4
py	d1	4
px	d2	-2
pl	d3	-2
z	d4	-2

Demand function x

Variables	Coefficients	Values
intercept	c0	6
py	c1	1
px	c2	-4
pl	c3	-2
z	c4	5

Shadowprice equation z

Variables	Coefficients	Values
intercept	e0	10
py	e1	4
px	e2	-5
pl	e3	2
z	e4	-8

Utility

Variables	Values
sl	2
sc	3
Coefficients	
al	0.4
ac	0.6

Demand xle

Variables	Coefficients	Values
sl	sl	2
(m-pl*sl-pc*sc)/pl	al	0.4

Demand xc

Variables	Coefficients	Values
1/pc	sc	3
(m-pl*sl-pc*sc)/pc	ac	0.6

Equations

y=bo+b1*py+b2*px+b3*pl+b4*z
x=c0+c1*py+c2*px+c3*pl+c4*z
xl=d0+d1*py+d2*px+c3*pl+c4*z
psz=e0+e1*py+e2*px+e3*pl+e4*z
xc=sc+(ac(m-pl*sl-pc*sc))/pc
xle=sl+(al(m-pl*sl-pc*sc))/pl
yloff=lab-xl-xle
incoff=yloff*pl
profit=ao+a1*py+a2*px+a3pl+a4*z
+a5*py*py+a6*px*px+a7*pl*pl+a8*z*z
+a9*py*px+a10*py*pl+a11*py*z+a12*px*pl+a13*px*z+a14*pl*z
INC=profit+Incoff-pz*z
Exp=pc*xc
Sav=INC-Exp

Formula for calculating shadow price of on-farm labour

a=-d3
b=-(-lab+sl-al*sl+d0+d1*py+d2*px+d4*z
c=-al-m+al*pc*sc
pl1=(-b+SQRT(b*b-4*a*c))/2*a
pl2=(-b-SQRT(b*b-4*a*c))/2*a

Internal factor's variables

Exogenous	Base run	Decoupled payments Intervention
py	1	1
px	1	1
pl	1	1
z	1	1
pc	1	1
m	14	19
lab	10	10
pz	1	1
plex	1	1
yloff	2	2

		Decoupled payments	
Endogenous	Base run	Intervention	Effect %
pl	0.71	0.95	34
y	16.17	15.18	-6
x	6.58	6.09	-7
xl	2.58	2.09	-19
psz	2.42	2.91	20
xc	8.75	11.46	31
xle	7.42	7.91	7
profit	13.17	13.00	-1
Incoff	2.00	2.00	0
INC	14.17	14.00	-1
Exp	8.75	11.46	31
Sav	5.42	2.55	-53

External factor's variables

		Transaction costs	Dutch disease
Exogenous	Base run	Intervention	Intervention
py	1	0.8	0.8
px	1	1.2	0.8
pl	1	1	1
z	1	1	1
pc	1	1	1
m	19	19	19
lab	10	10	10
pz	1	1	1
plex	1	0.8	1
yloff	2	2	2

		Transaction costs		Dutch disease	
Endogenous	Base run	Intervention	Effect %	Intervention	Effect %
pl	0.95	0.83	-13	0.91	-4
y	15.18	13.06	-14	13.15	-13
x	6.09	5.33	-12	6.78	11
xl	2.09	1.13	-46	1.78	-15
psz	2.91	0.87	-70	3.02	4
xc	11.46	11.60	1	11.51	0
xle	7.91	8.87	12	8.22	4
profit	13.00	9.02	-31	11.46	-12
Incoff	2.00	1.60	-20	2.00	0
INC	14.00	9.62	-31	12.46	-11
Exp	11.46	11.60	1	11.51	0
Sav	2.55	-1.98	-178	0.95	-63

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