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The developments and trends of the agricultural sector in Greece

Abstract. The purpose of this paper is to analyse the changes in the efficiency of Greek agriculture production in the period 1911-2011, and to estimate the trends that emerged, especially after the country joined the E.U. in 1981. The applied methodology uses both quantitative methods (econometric approach), as well as the social-historical interpretation of rural policy, as established in the last hundred years.

The paper is organized as follows: in the first section we review the evolutions in the accumulation of wealth and the income. In the second section we describe our methodology and data sources used in the analysis. Next, we present and discuss the results. We conclude with some proposals which stem from the analysis.

Key words: agricultural policy, subsidies policy, capital accumulation, savings behaviour, efficiency, Greece.

Introduction

In the period between 1830 and 1870 many institutions were established in Greece (introduced from Western Europe). However, the economic potential of the newly formed small state and the chronic hangovers from the long-lasting Ottoman Rule resulted in a delay in modernization. The agricultural sector, across the coastal areas, was dominated by the cultivation of raisins, which together with the cultivation of tobacco, until 1960, were the main exported products (Table 1).

Table 1. Exports (millions \$)

Agricultural exports	1937	1950
Tobacco	40,0	38,0
Currants	9,0	12,0
Raisins (sultanas)	4,0	14,0
Olive oil	2,0	0,5
Olives	2,3	3,3
Total country exports	86,0	90,0

Source: Varvaresos K. [1952].

In the agricultural sector, across the coastal areas, the cultivation of raisins dominated, and raisins and tobacco were the main export products until 1960. The expansion of the country after 1920 and the inflow of refugees forced the state to apply a more systematic

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policy. In the 1920s the expropriation of Manors began and land was given to the landless. Also, the Ministry of Agriculture and the Agricultural Bank were established.

In the next decade, through an extensive program of land improvement projects, the agricultural land increased (with flood protection and drainage networks) and the irrigated areas were multiplied. The Second World War and the subsequent Civil War interrupted the effort, which continued strongly after 1950 (initially aided by the Marshall Plan).

This development seemed to be terminated in early 1980s. The accession to EU (1981) misquoted the terms of trade. Due to the Common Agricultural Policy (CAP), tariffs to third countries were increased while trade exchanges among member states were expanded which resulted in a negative⁴ balance of trade in regard to agricultural produce. The Community subsidies were channeled mainly to maintain a rather problematic model, i.e. they were geared to consumption increase rather than to structural changes. This policy, with slight variations, has been maintained until today.

The evolutions in the accumulation of wealth and income

The effort for the industrialization of the country led to a rapid decline of the agricultural sector and its importance. As shown in Table 1 while the agricultural produce in 1950 was 28% of total GDP, sixty years later (2010) the contribution is rather insignificant, amounting to about 3%.

The progress of industrialization seems to have failed, because after the country's accession to the EU, the tariff abolition and the gradual rise in wages (and salaries) shrank the manufacturing sector. It is the large size of the construction sector that maintains the declining percentage at these moderate levels.

Table 2. Structure of Gross Domestic Product (GDP) by sectors (%)

Sectors	1950	1960	1970	1980	1990	2000	2010
Primary	27,8	23,1	18,2	14,9	11,0	6,6	3,3
Secondary	20,1	25,9	31,4	32,4	30,4	21,0	17,9
Tertiary	52,1	51,0	50,4	53,1	58,6	72,4	78,8
GDP	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Source: Papailias [2014].

Table 3 shows the contribution of the agricultural sector to the economic growth in the period 1950-1995. It is obvious that the role of the rural sector in the whole economy is diminishing as regards its contribution to capital accumulation, its increasing inability to cover the deficit in the balance of trade, and in general its declining contribution to the national income.

The decline of the Greek agricultural sector continues in the 21st century. Greece in 2007 presented, on the base 2000=100, the worst development in Europe, with the exception of Italy (Table 4). The causes behind these developments derive from a combination of political, economic and geographical constraints.

⁴ CAP protected more effectively the “north” products, i.e. livestock, compared with the “south” products of plant origin (i.e. vegetable, olive, fruit).

Table 3. Contribution of the agricultural sector to the growth rates of variables that characterized the growth of the postwar period (averages)

Contribution of agricultural variables to variable rates of change of corresponding variables of the national economy	Pre-accession period			Post-accession period	
	1950-1960	1960-1970	1970-1980	1980-1990	1990-1994
1. Capital accumulation	12,1%	13,6%	9,5%	1,9%	5,4%
2. Creation of product (GDP)	27,1%	21,4%	15,1%	13,4%	12,7%
3. Value of imports	20,2%	14,5%	10,0%	12,5%	21,6%
4. Value of exports	66,9%	55,2%	30,2%	28,2%	20,7%
5. Available goods	47,0%	34,2%	24,2%	27,9%	23,6%
6. Import penetration	24,7%	26,1%	28,1%	34,2%	45,9%
7. Labor supply	51,3%	46,9%	34,0%	26,0%	22,0%
8. Performed national income	32,8%	23,0%	18,1%	17,4%	15,9%

Source: Sapounas [1991].

Firstly, Greece is fundamentally different from almost all countries of Europe (Eastern and Western), but also from other Mediterranean countries (Spain, Italy, the Balkans). It combines the most geographical handicaps when compared to other countries. The many high mountains, the great number of islands and the large semi-arid areas result in many negative economies.

Table 4. Evolution of agricultural income

Change in real agricultural income per worker in 2007				
	Indicators 2007 (2000=100)		Indicators 2007 (2000=100)	
EU 27	115,9	Slovenia	147,3	
Lithuania	250,2	France	105,6	
Estonia	285,2	United Kingdom	133,4	
Czech Republic	186,2	Holland	99,3	
Sweden	123,1	Denmark	107,5	
Finland	114,7	Belgium	89,5	
Luxemburg	104,9	<i>Greece</i>	83,1	
Poland	213,2	Cyprus	100,3	
Germany	132,9	Hungary	144,8	
Spain	105,3	Malta	103,8	
Latvia	308,8	Italy	81,8	
Ireland	89,9	Portugal	118,9	
Slovakia	161,5	Bulgaria	95,4	
Austria	129,7	Romania	123,5	

Source: Bank of Piraeus [2008].

In the first hundred years (1828-1923) the pursuit to resolve the national question was absorbing all the efforts. With the exception of other Balkan countries, in Greece, the

starting point for reconstruction was much lower in relation with other European countries. Due to the Ottoman Rule, structures were more retrogressive than those of the West and North. At the time, in these areas of Europe, industrial capitalism and bourgeois democracy prevailed. Therefore, the elite, which had western manners and perception, after the seizure of power in Greece gave more importance to trade, crafts and industry and less to the rural sector. In 1880 the western spirit and the institutions (laws, etc.) dominated, but the potential of the small country was limited.

The “take off”, in the meaning that the prerequisites existed, took place after 1923. The country had doubled and acquired fertile areas, while the cheap labor force (recruited mainly from refugees) and the rapid landing at the existing social and economic situation, which coincides with the completion of national integration, triggered off a fuse towards economic growth.

The major production projects (land reclamation) in the plains of Macedonia gave a great impulse to economic growth. [Stefanidis 1948]. Gradually the double developmental squeeze model began to be implemented. The State through the establishment of the Agricultural Bank, which in fact constituted an agricultural fund, managed to penetrate all small communities. The establishment of a huge number of cooperatives, most of which functioned as carriers of state loans, gave the state further opportunities to intervene even in the most remote village. Soon lending from other banks to farmers was banned and the state subsidized the interest rates of the Agricultural Bank in order to safeguard this policy.

Furthermore, particularly after World War II, the Bank traded seeds, pesticides, and offered strong incentives for the purchase of machinery (especially tractors).

In this way after 1950 a more intensive capital accumulation began.

According to one of the few measurements that have been made on the subject [Momferatos 1954], in 1938 agriculture accounted for 3% of total fixed capital, while in 1952 the percentage was 4.7 %. Excluding the housing sector from these measurements the percentages are 10.2% and 15.1% respectively.

According to our measurements, in 1911 the fixed capital of public investment and private investment amounted to 4.5 million drachmas at constant 1970 prices. In 1923, despite the growth of the country it remained at 5.3 million drachmas, but in 1940 it increased by 3.5 times (18.5 million drachmas).

In the 1950s, the fixed capital was slightly higher than that registered in the 1940s, but in the 1980s it exceeded 100 million drachmas in 1970 prices. During the nineties it fluctuated at about the same levels while in 2000s it was estimated slightly higher (Table 5).

It can be concluded that the accumulation of capital had been brought to completion by 1980. This is not a random fact. Taking into consideration the size of the average holding (3 hectares or 30 ‘stremmas’, consisting of numerous parcels) it was expected that the evolution had ended. In 1950 there were five thousand tractors while in 1983 there were over 280 thousand. It is difficult to find anywhere else such a spectacular case of mechanization. This rapid capital accumulation, the increase in the use of fertilizers and use of improved seeds had as a result an increase in the volume of production by seven times in the period 1950-1980. However, the income of farmers increased only by three times in this period. This is due to the fact that, because of the deterioration of the internal terms of trade (Model *Mill-Marshall*), the prices of agricultural products increased slowly compared with those of the urban sector.

Table 5. Evolution of main variables (1911-1970)

YEARS	Fix capital	Plant	Livestock	Stock	Land	Labor	Income
	In '000 drachmas (at 1970 prices)				'000 acres	'000	'000 drachmas (at 1970 prices)
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5=2+3+4</i>	<i>6</i>	<i>7</i>	<i>8</i>
1911	4500	20493	6225	31218	9913	850	9985
1923	5479	28438	12200	46117	14490	1686	11273
1930	9067	31307	15806	56180	19823	1723	9935
1940	18528	49654	16845	85027	27380	1949	17013
1950	19288	47982	14490	81760	27253	1892	20683
1960	28713	76035	19413	124161	35630	2039	29863
1970	61774	90116	16562	168452	34463	1658	47058

Source: own calculations.

The increasing competition forced farmers to modernize, but the control of prices by the Ministry of Commerce (i.e. double developmental squeeze) resulted in the agricultural income rising at a slower pace than the volume of production [Papailias 2014].

This policy had as a consequence the depopulation of rural areas and subsequent migration to urban areas or abroad (mainly to Germany, Australia, USA).

From other evidence, we can note significant stagnation in livestock capital. It increased slowly until the 1960s and then began to decline. It is unlikely – it would be almost a miracle – that livestock will rise again in the following period. Therefore, the country will show a permanent deficit in animal products.

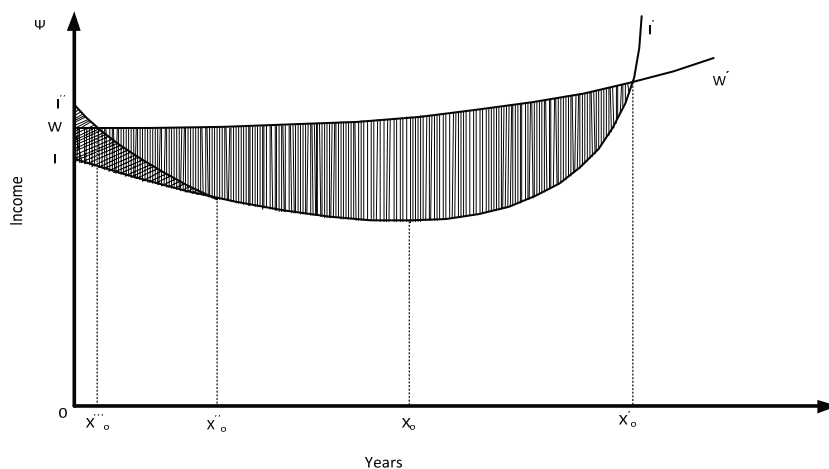


Fig. 1. The evolution of agricultural income and the subsistence minimum

Source: Papailias T. [2014].

Conversely, plantations are on the rise. The increase in olive tree plantations allows us to forecast that soon the country will be the second biggest olive oil producer following Spain. However, harvesting problems due to extensive migration, together with marketing

inefficiency to penetrate new markets put limitations that aggravate the situation. The size of arable land reached the upper limits (35 million “stremmas”). Nevertheless, irrigation problems exist, with irrigated land already covering 40%.

The labour force decreases steadily. In 2010 it reached 510 thousand people. Immigrants and mechanization cover the labour shortage.

It has been estimated that, due to family farming – dominated by small holdings – the rural income ranged at subsistence minimum. The Mill-Marshall model (development of the urban sector through internal deterioration of terms of trade) worked in the country as shown in the following figure. The curve II' reflects the level of farming income, while the curve $W'W'$ shows the level of subsistence minimum in rural areas.

Firstly – during the period 1923-1935 – the agricultural produce was higher than the subsistence minimum (axis point before X_0'''). Between X_0''' and X_0' , the appropriation surplus resulted in the maintenance of incomes below the socially tolerable living standards (period 1959-1977). After 1977 (pro-accession period in E.U.), the prices of agricultural products increased. Simultaneously, a large portion of the population had migrated, which led to the rise of household income. However, the pressure for modernization during those years led to substantial growth in the accumulation of capital.

Methodology and results

In this section of the paper we will try to estimate the linear and logarithmic form of functions using statistical data and implementing statistical package *stata*. Specifically we will try to correlate agricultural incomes with each one of the following variables: soil, labour, capital assets, livestock, and plantations. Subsequently, in each independent variable we add the next one.

Table 6. Linear function

Source	SS	df	MS	Number of obs = 74		
				F(5, 68) = 812.24		
Model	2.6381e+10	5	5.2762e+09	Prob > F = 0.0000		
Residual	441716199	68	6495826.45	R-squared = 0.9835		
				Adj R-squared = 0.9823		
Total	2.6823e+10	73	367432133	Root MSE = 2548.7		

Income	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	

Fixed capital	.0967826	.0453635	2.13	0.036	.0062612	.187304

Source: own calculations.

From 79 observations (1911-1990) five (5) were removed since they were related to the period of the German occupation, during which production had collapsed. The coefficient of multiple determination is very high approaching the unit. The student's “t” is relatively high for two variables: land and livestock.

When the 1950s decade is removed we have 69 observations and the estimated function appears as the better. In this estimation the coefficient of multiple determination is approaching 99%, and “t” for the “fixed capital” and “plantations” increased and for

"livestock", "cultivated land" and "labor" decreased. The value of Durbin-Watson is satisfactory.

Table 7. Regression analysis

Source	SS	df	MS	Number of obs = 69		
Model	2.5172e+10	5	5.0344e+09	F(5, 63) = 964.60		
Residual	328806880	63	5219156.83	Prob > F = 0.0000		
Total	2.5501e+10	68	375013567	R-squared = 0.9871		
				Adj R-squared = 0.9861		
				Root MSE = 2284.5		

Income	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fix_capital	.1334456	.0433918	3.08	0.003	.046734	.2201571
plant	.4464176	.0693928	6.43	0.000	.307747	.5850881
livestock	.0343061	.2417579	0.14	0.888	-.448809	.5174207
land	.1119732	.1904139	0.59	0.559	-.268539	.4924851
labor	-5.771168	3.132408	-1.84	0.070	-12.03079	.4884494
_cons	4070.37	2890.836	1.40	0.164	-1706.504	9847.245

Durbin-Watson d-statistic (6, 69) = 1.362628

Source: own calculations.

Similar calculations were made after the segmentation of the period 1911-1990. We have distinguished three sub-periods. The first covered the years 1923 to 1940, the second the years 1950-1980, and the third the years 1977-1990.

The period segmentation was based on the following criteria: the first period covers the years of efforts to create a specific rural policy, which was interrupted by the war. The second one involves the post-war period up to accession to the EU, while the third period covers the negotiations for EU accession until 1990. For the estimation of the regressions on the basis of variable logarithms we followed the same procedure. We arrived at the following result:

$$Y = -21.47778 + 0.0527282 \ln K + 0.9135719 \ln \text{Plant} + 0.011323 \ln \text{livestock} - 0.3532739 \ln \text{land} + 0.1071219 \ln \text{labor}$$

$$R^2 = 0.9623$$

$$\text{Durbin-Watson} = 1.352631$$

The criterion Cochrane-Orcutt AR(1)

Conclusion

The momentum developed in the Greek territory in the period 1923-1940 seemed to pay off in the years 1950-1980. The accumulation of capital was impressive, as well as the number of plantations. In contrast, livestock decreased due to geographical constraints and the abandonment of rural areas. Cropland has reached its highest levels and therefore further exploitation of land seems to be impossible.

The continuous decline in population rates was overcome to some extent by immigrants and the intensive use of machinery. The survival of the majority of farmers is achieved due to non-agricultural income and subsidies from the EU. The discontinuation of

subsidies is expected to aggravate the situation. Considering the above-mentioned reasons and the existing technology we conclude that it is difficult to increase the income.

During the same period, crop restructuring was partially achieved, but the results are mediocre. It seems that it is difficult to realize a further accumulation of capital. By the end of 2005, production grew slightly due to the growth of plantations and land improvements. However, it is estimated that such reserves are missing now from the Greek agricultural sector. Because of international competition the probability of price increases is very low. The same applies to community protectionist measures.

Consequently, the Greek rural economy remains trapped in crisis and for the majority of farmers income will continue to move down. A further restructuring of crops and the successful marketing of products would be a solution.

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