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THE IMPACT OF POLICY MEASURES ON GRAPE PRODUCTION
EMPLOYMENT AND GROWERS INCOME FOR THE MAIN VITICULTURAL
ZONES OF CYPRUS

S. Papachristodoulou and Chr. Papayiannis

AGRICULTURAL RESEARCH INSTITUTE
MINISTRY OF AGRICULTURE AND NATURAL RESOURCES

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S U M M A R Y

This study examines the main problems of viticulture and tests the extent to which alternative policies for restructuring may improve the quality and limit the quantity of grapes and enhance family incomes. Replanting of 3000 ha of low productivity vineyards with new wine grape varieties in combination with permanent abandonment of 4000 ha of vineyards and replacement of a further 1000 ha of mean productivity vines with other crops and livestock, establishment of three vintage wineries in the major viticultural zones and construction and maintenance of 1800 km farm roads could have the following impact.

1. In the short-run the total production of grapes could be reduced by 40-50 thousand t and in the long-run by 20 thousand t, with the replacement of 12.5 thousand t of Local black grapes by 35 thousand t of high quality grapes.

2. Labour is expected to be released (460 full-time jobs) which if employed off-farm (currently there are opportunities) will increase family income of growers.

3. Annual income will increase by 1.8 to 7.6% depending on the zone, and therefore, would slow or even eliminate the relative declining of incomes in the years to come.

ΠΕΡΙΛΗΨΗ

Η παρούσα μελέτη εξετάζει τα κυριώτερα προβλήματα της αμπελοκαλλιέργειας και το βαθμό στον οποίο η εφαρμογή διαφόρων μέτρων πολιτικής θα μπορούσε να συμβάλει στην βελτίωση της ποιότητας και τη μείωση της ποσότητας των παραγομένων σταφυλιών. Αναμείλωση 3000 εκταρίων αμπελιών χαμηλής παραγωγικότητας με νέες οινοποιήσιμες ποικιλίες, σε συνδυασμό με την εκρίζωση 4000 εκταρίων αμπελιών χωρίς αντικατάσταση και την παραπέρα αντικατάσταση 1000 εκταρίων αμπελιών μέσης παραγωγικότητας με άλλες καλλιέργειες και ζώα, δημιουργία τριών οινοποιείων στις κυριώτερες αμπελοαγωγικές ζώνες και διάνοιξη 1800 χλμ αγροτικών δρόμων, θα μπορούσαν να έχουν τις πιο κάτω επιπτώσεις.

1. Βραχυπρόθεσμα, η συνολική παραγωγή σταφυλιών θα μπορούσε να μειωθεί κατά 40-50 χιλ τόννους και μακροπρόθεσμα κατά 20 χιλ τόννους με αντικατάσταση 12.5 χιλ τόννων μαύρων σταφυλιών με 35 χιλ τόννους υψηλής ποιότητας σταφυλιών.

2. Αναμένεται να ελευθερωθεί εργασία ίση με 460 μονάδες πλήρους απασχόλησης η οποία αν απασχοληθεί εκτός εκμεταλλεύσεων (τώρα υπάρχουν οι δυνατότητες απασχόλησης) θα αυξήσει το οικογενειακό εισόδημα του αμπελοαγωγού.

3. Αναμένεται επίσης η αύξηση του ετήσιου εισοδήματος των αμπελοαγωγών κατά 1.8-7.6% ανάλογα με την ζώνη. Αυτή η αύξηση αναμένεται να επιβραδύνει και να σταματήσει τελείως την σχετική μείωση των εισοδημάτων των αμπελοαγωγών για τα επόμενα χρόνια.

INTRODUCTION

Wine grape cultivation is one of the most important activities of the rural population of Cyprus. Its social and economic importance lies with the provision of employment and income to numerous families living in less favoured rural areas. About 17,800 farms (40% of the total) include in their cropping pattern wine grapes which take 20.8% of the total cropped area. They generate an agricultural output of C£15.0 million and their contribution to total agricultural exports is 24.1% and 9.7% of total domestic exports. The crop is faced with severe problems which can be divided into production, social, economic and marketing ones. The main objective of this report is to test the extent to which viticulture can contribute to family incomes if a package of policies for restructuring is implemented.

VITICULTURAL PROBLEMS

Production problems

The system of wine grape production is distinguished into traditional and modern. Under the traditional system, production is characterized by high costs and low productivity, but product quality is excellent when produced in the highlands. Old and irregularly spaced vineyards established on infertile land without soil conservation works, land fragmentation and lack of access roads and farm mechanization were identified as main reasons conducive to low productivity and high costs of production (Rossi 1956; Marcout 1959; Branas 1957; Logothetis 1975; Papayiannis 1980; Papachristodoulou *et. al.* 1987). Under the modern production system the situation is exactly reverse. Recent (1970-80) expansion of vine cultivation in the more fertile lowlands increased productivity and lowered costs of production, but the quality of grapes is very low.

Social problems

Many rural families depend to a great extent on viticulture which significantly affects their income

and standard of living. The human factor in grape production cannot be overlooked. Besides, there is a clear political consensus that rural depressed areas, where most of the vine growers reside, should not be allowed to deteriorate any further. In these areas, there exist clear signs of depopulation and ageing of the remaining population. Some of the villages cannot support public utilities any more (Papachristodoulou and Upton, 1989). Policy measures must be taken by the Government in order to assist people to increase their income earning power (on- or off-farm). Various development projects have already been promoted by the Government towards this end (e.g. Pitsilia Integrated Rural Development Project). Further development of all rural areas is planned through the implementation of the 5th Emergency Economic Action Plan 1987-91 the objectives of which are to:

- i. stabilize rural population at levels comparable with the development potential of each region.
- ii. raise the standard of living at satisfactory levels so as to reduce differences between urban and rural areas.
- iii. create additional employment opportunities (light industries, tourism etc.).
- iv. improve the quality of life by upgrading the public services and establishing the necessary social and cultural infrastructure.
- v. improve the road network connecting the villages, and the villages with urban centers, and
- vi. strengthen local authorities so they can participate and play an active role in development projects.

Hence, it seems that a well balanced integrated rural development project is required in order to meet the above objectives.

Economic problems

The major economic problems of viticulture are centered around the high costs of production (Papachristodoulou and Papayiannis, 1988 and 1989). Achievement of a balance among quality of grapes produced, yield level and prices, would enhance production of quality grapes. This balance differs among varieties, locations and soil and climatic

conditions. The Viticulture and Oenology section of the Department of Agriculture is running experimental/demonstrational vineyards in all viticultural environments and important results have already been available.

The ultimate objective of any improvement should be the raising of income per unit of area and provision of adequate returns to the committed production factors.

The vine industry is heavily subsidized. The total amount of subsidies paid is about C£6.6 million. Wine grape production absorbs 56.5% of the total subsidy, zivania (49% raw grape alcohol) and raisins production (including expenses of the Vine Products Commission) absorb 23.6%, vineyard area subsidy 12.0%, and wine exports 7.8%.

Marketing problems

Cyprus leads the world in per capita production of grapes. It produces all kinds of alcoholic beverages, concentrated grape must/juice and raisins. The total demand for vine products consists of the foreign export component (85-90% of total grape production; DSR, 1961-87) and the local consumption component (Papachristodoulou and Panayiotou, 1988). The almost complete dependence on export markets makes the wine industry vulnerable to external changes, creating local crises.

Wine exports were dependent on one market (UK), one product (sherry) and one style of sherry (cream; Acumen, 1977; Arnaud, 1980; MEMRB, 1987). The preferential treatment of Cyprus sherry on the UK market gave it a distinct advantage over Spanish sherry. After the British accession to the EEC, exports of Cyprus sherry to the UK market fell dramatically. The problem was alleviated by the very large purchases the USSR was making (red-wine in bulk, eau-de-vie-de-vin and raisins). After 1985 when the USSR stopped importing alcoholic beverages, the problem of surpluses was exasperated.

The Custom's Union Agreement between Cyprus and the EEC, enacted on 1st January, 1988, offers a new challenge for profitable disposal of vine products during the 10-year transition period and thereafter. The Association Agreement Protocol offers additional tariff quotas and reductions for most of the vine products which are expected to have considerable trade effects on the parties involved. Adoption of the French system of Controlled Appellation for production of quality wines, could be another way to solving the problem.

Expert advice (FAO, 1979) emphasised that:

- a) the area under vines should not be increased,
- b) new varieties should be introduced to replace the old and unproductive ones.

A number of improved varieties was imported in 1959, but results of the vine replanting scheme, set forth in 1970, were disappointing. One reason for the delay of the project, which was supposed to follow the self-help approach, was that farmers were lacking the required capital for the initial investment (Papachristodoulou, 1979). Other reasons are given by Papachristodoulou and Papayiannis, 1989.

METHODOLOGY

The total impact of several different policy measures appraised (Papachristodoulou and Papayiannis, 1989; Papachristodoulou and Ansell, 1989) on production of grapes, employment and family income of growers is estimated assuming that a package of such measures is implemented within the next 10-15 years.

The following four policy measures were included in the package.

- i. Replanting of 3000 ha of old vineyards with new varieties of wine grapes in zones A, B and C (Appendix Table 1; Papachristodoulou and Papayiannis, 1989).
- ii. Permanent abandonment of 4000 ha of vineyards and replacement of a further 1000 ha with rainfed

Table 1. Impact of policy measures on balancing grape production and other products by zone.

Zones	Production of wine grape (t)			Incremental production of (t)			
	Before	After ^{a)}	Balance	Olives	Almonds	Milk	Meat
Vine replanting with new varieties	<u>12,500</u>	<u>35,044</u>	<u>22,544</u>				
Mountain	2,900	8,028	5,128				
Commandaria	-	-	-				
Krasokhoria	4,300	10,277	5,977				
Vines Paphos	5,300	16,739	11,439				
Semi-mountain	-	-	-				
Permanently abandonment of vineyards or replacement of vineyards	<u>42,500</u>	^{b)}	<u>-42,500</u>				
Vines Paphos	28,500	-	-28,500	1,200	500	1,670	330
Semi-mountain	14,000	-	-14,000	600	250	830	170
VINES ZONES	55,000	35,044	-19,956	1,800	750	2,500	500

a) after 15 years

b) after 5-7 years

crops and livestock, in the parts of zone C least suited to producing good quality vine grapes (Appendix Table 1; Papachristodoulou and Ansell, 1989).

iii. Establishment of three vintage wineries, one in each of the three quality zones, A, B and C (Appendix Table 2).

iv. Construction and maintenance of 1800 km of farm roads in zones A,B and C (Appendix Table 3).

RESULTS

Impact of policy measures on production of grapes and other crops and livestock products.

Replanting 3000 ha of existing vineyards would reduce the production of Local black grapes by 12500 t and increase grape production of new varieties by about 35000 t (balance 22500 t). Assuming that the already planted new varieties have the capacity to produce 10000 - 12000 t, the final capacity would be about 45000 - 47000 t by the first decade of the 21st century. The balance of grape production by quality zone is given in Table 1.

Permanent abandonment of 4000 ha of vineyards and replacement of 1000 ha with other crop and livestock enterprises, would reduce production of grapes (Local black variety) in Vines Paphos and Semi-mountain zones by 42500 t. The introduction of new crops i.e. olives, almonds and roughage and livestock (sheep) could yield 1800 t of olives, 750 t of almonds, 2500 t of sheep milk and 500 t of sheep meat. This additional production is not expected to face any marketing problems (Table 1; Papachristodoulou and Ansell, 1989).

Impact of policy measures on employment.

In order to estimate the impact on employment, one has to start from the present situation and, assuming the implementation of the proposed policy measures, to project into the future.

Vine replanting and vintage wineries would demand additional labour (190 full-time jobs), while

Vine abandonment or replacement and farm roads would release labour (651 full-time jobs). In all zones, except Mountain, there would be a decrease in employment by 17 to 274 full-time jobs. The overall loss of employment would be 2.0 weeks or 3% per family (Table 2).

Reduction in employment in the rural areas could be interpreted as undesirable since policy measures aim at maintaining population there. However, a close examination of the figures shows that:

1. The most depressed Mountain zone, gains employment (20 full-time jobs).
2. Commandaria and Krasokhoria lose 36 and 17 full-time jobs respectively. The reduction in employment results from the construction of farm roads which contribute to the improvement of productivity of labour and make the life of growers much easier.
3. In Vines Paphos and Semi-mountain zones, which are the less depressed, the reduction of employment is more pronounced (274 and 154 full-time jobs respectively). Vine abandonment and/or replacement of vines and the construction of farm roads are the main reasons for the reduction in employment. The loss in employment could well be covered by commuting to Paphos, a new tourist destination, where a shortage of labour is observed.

Impact of policy measures on income

In order to estimate the impact of policy measures on income one has to rely on the Net Present Values (NPV) which are converted into equivalent annuities and divided by the total population of each viticultural zone to arrive at the incremental annual per capita income.

Results of the above calculations (overall and by zone) are given in Table 3. The incremental income per capita for the most depressed areas is C£18.6 for Mountains C£21.5 for Commandaria and C£97.6 for Krasokhoria. For the less depressed areas it is C£67.5 for Vines Paphos and C£34.0 for Semi-mountain. The percentage increase of the per capita income over the present level ranges from 1.8% in

Table 3. Impact of policy measures on income per capita by zone.

Zones	Annuity (in 1000 C£)					Popula- tion	Incre- mental C£/capita	Present income C£/capita	% change
	Vine replanting	Vintage wineries	Farm roads	Vine replacement	TOTAL				
Mountain	74.4	140.0	63.3	-	277.7	14,913	18.6	1035	1.8
Commandaria	-	-	50.6	-	50.6	2,348	21.5	1116	1.9
Krasokhoria	134.8	140.0	113.8	-	388.6	3,983	97.6	1000	7.6
Vines Paphos	197.3	140.0	164.5	193.1	694.9	10,301	67.5	1618	4.2
Semi-mountain	-	-	63.3	96.5	159.8	4,699	34.0	1762	1.9
VINES ZONES	406.5	420.0	455.5	289.6	1571.6	36,244	43.4	1296	3.3

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Table 2. Impact of policy measures on employment by zone.

Zones	Balance of labour requirements					Full time jobs (No)	Families (No)	Weeks/ family
	Vine replanting	Vintage wineries	Farm roads	Vine replacement	TOTAL			
Mountain	128.9	15.0	-100.0	-	43.9	20	4841	0.2
Commandaria	-	-	-89.0	-	-80.0	-36	727	2.5
Krasokhoria	127.7	15.0	-180.0	-	-37.3	-17	1390	0.6
Vines Paphos	124.5	15.0	-260.0	-492.3	-612.8	-274	3387	4.1
Semi-mountain	-	-	-100.0	-246.1	-346.1	-154	1459	5.4
VINES ZONES	381.1	45.0	-720.0	-738.4	-1032.3	-461	11804	2.0

Commandaria to 7.6% in Krasokhoria zone. For all viticultural zones the annual incremental income generated from the implementation of the proposed policies is C£1.6 million or C£43.4 per capita. This amount is the minimum income generated because its calculation was based on the present set of prices and subsidies. It is expected, that with the implementation of the proposed policies the income generation capacity will be increased due to increased quality of the wine produced (Papachristodoulou and Papayiannis, 1989).

It should be noted that in all viticultural zones farm incomes have grown much more slowly over the last 5 years than the national gross domestic product (Appendix Table 4). This relative decline in farm incomes was compensated by the off-farm incomes of rural households the growth of which was faster and their contribution to the family income more important. Nonetheless in the three vine-growing zones of Mountains, Commandaria and Krasokhoria, family incomes of rural households have grown more slowly than national income over the last five years.

If the proposed policy package is implemented, and the per capita incomes of vine growers increase by the percentages given in Table 3, their decline in relation to the rest of the economy may be halted.

CONCLUSIONS

With the implementation of the proposed policies production of grapes could be reduced by 40-50 thousand t in the next 5 to 7 years. In the long-run, however, the final reduction is expected to be much smaller (about 20000 t) because of the extra production from the vineyards replanted with new quality varieties. So the final balance of production of grapes could be summarized as follows:

Production of low quality grapes will decrease progressively and reach its minimum at the end of the period of permanent abandonment of 4000 ha of

vineyards and replacement of 1000 ha of vineyards with other crops and livestock. The reduction in area and output of grapes will reduce the total cost of vine subsidies accordingly. With the implementation of 3000 ha of vine replanting (at full development) 12500 t of local black grapes will be replaced by about 35000 t of high quality grapes of different varieties.

About 460 full-time jobs are expected to be lost but the productivity of the remaining labour is expected to improve and transport will be facilitated. Because of the shortage of labour in the nearby coastal urban centres it is expected that any displaced labour will be gainfully employed there.

The incremental annual income generated by the implementation of the proposed policy measures will enhance the total annual income in these zones by between 1.8 to 7.6%. This would slow, or even eliminate, the relative decline of the incomes of viticultural families in the next decade.

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Appendix Table II Impact of policy measures on production, employment and income.

	Area		Yield		Production (t)			Labour requirements (hrs)					N P V Annuity	
	ha	%	t/ha		Before	After	Diffe- rence	Hrs/ha		Total (1000's)			CE/ha	TOTAL CE
			Before	After				Before	After	Before	After	Difference		
1. VINE REPLANTING														
Quality zone A	1000		2.9 ^{a/}	8.0	2,900	8,028	5,128	225 ^{a/}	354	225.0	353.9	128.9		72,440
Cabernet franc	150	15		5.4		810			325		48.7		62	9,300
Mataro	430	43		8.0		3,440			351		150.9		75	32,250
Riesling	60	6		5.8		348			337		20.2		62	3,720
Malvasia grossa	130	13		9.8		1,274			383		49.8		77	10,010
Local white	220	22		9.8		2,156			383		84.3		78	17,160
Quality zone B	1000		4.3 ^{b/}	10.3	4,300	10,277	5,977	255 ^{b/}	383	255.0	382.7	127.7		134,860
Shiraz	170	17		8.0		1,360			351		59.7		114	19,380
Mataro	470	47		8.9		4,183			370		173.9		127	59,690
Malvasia - Jaen	130	13		14.3		1,859			415		53.9		172	22,360
Plant 'X', Chenin blanc	130	13		12.5		1,625			414		53.8		151	19,630
Local white	100	10		12.5		1,250			414		41.4		138	13,800
Quality zone C	1000		5.3 ^{b/}	16.7	5,300	16,739	11,439	285 ^{b/}	409	285.0	409.5	124.5		197,270
Malvasia - Jaen	480	48		17.9		8,592			415		199.2		205	98,400
Alicante - Plant 'X', Chenin	430	43		15.2		6,536			402		172.9		191	82,130
Local white	90	9		17.9		1,611			415		37.4		186	16,740
GRAND TOTAL (1)	3000		4.2	11.7	12,500	35,044	22,544	255	382	765.0	1146.1	381.1		404,570
2. VINE REPLACEMENT														
a) 'Set aside' policy	4000		8.5	-	34,000		-34,000	375		1500.0	-	-1500.0	25	-100,000
b) Replacement with	1000		8.5	-	8,500		-8,500	375		375.0	-	-375.0	25	-25,000
Olives	(300)			6.0		1,800	1,800		1,095		328.5	328.5	408	122,400
Almonds	(200)			3.7		740	740		683		136.6	136.6	61	12,200
Roughages	(500)			-		-	-		23		11.5	11.5	-	-
Livestock (No)	(20000) ^{c/}								33		660.0	660.0	14	280,000
Milk (t)				130.0		2,501	2,501							
Meat (t)				25.0		500	500							
GRAND TOTAL (2)										1875.0	1136.6	-738.4		289,600
3. VINTAGE WINERIES (No)	3								15,000		45.0	45.0	140000	420,000
4. FARM ROADS (Km)	1800								400		720.0	-720.0	253	455,400

Sources: S. Papachristodoulou and Chr. Papayiannis 1989. Evaluation of wine replanting
S. Papachristodoulou and D.J. Ansell, 1989. Policies to limit wine grape pro-
duction. Own calculations

a) mean productivity b) low productivity
c) it includes 760 rams

Appendix Table 2. Cashflow projections of a vintage winery for Quality zone A
(capacity: 1920 tons of fresh grapes).

	Economic Adjustment Factor	Year										
		1	2	3	4	5	6	7	8	9	10-20	
OUTFLOW												
Capital Expenditure												
1. Land	1.00	7.0										
2. Site development	1.90	15.0										
3. Buildings	1.07	176.0	90.0									
4. Machinery	1.15	-	1186.0									
5. Furniture, fitting & other equipment	1.07	-	5.0									
6. Contingencies (1-5 @ 5%)		9.9	64.0									
TOTAL CAPITAL EXPENDITURE		207.9	1345.0									
Recurrent Expenditure												
1. Raw material (grapes)	1.00	-	60.1	110.9	133.5	134.4	134.4	134.4	134.4	134.4	134.4	134.4
2. Staff (labour and management)	1.00	-	28.0	28.6	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
3. Power consumption	1.15	-	2.1	3.9	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
4. Chemicals & filters	1.15	-	3.0	5.6	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
5. Packaging	1.05	-	-	20.6	107.8	189.7	213.3	214.9	214.9	214.9	214.9	214.9
6. Water	1.00	-	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
7. Fuel	1.15	-	0.7	1.3	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
8. Transportation	1.05	-	1.3	2.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
9. Spare parts	1.15	-	-	-	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
10. Maintenance, laboratory (tasting room) and office expenses	1.05	-	4.0	8.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
11. Insurance	1.00	-	6.0	9.0	11.0	11.2	11.2	11.2	11.2	11.2	11.2	11.2
12. Contingencies (1-11 @ 5%)		-	5.3	9.5	14.8	20.0	21.2	21.2	21.2	21.2	21.2	21.2
TOTAL RECURRENT EXPENDITURE		-	110.6	200.1	310.0	419.4	444.2	445.8	445.8	445.8	445.8	445.8
TOTAL OUTFLOW		207.9	1455.6	200.1	310.0	419.4	444.2	445.8	445.8	445.8	445.8	445.8
INFLOW												
Wine Sales	0.98 ^{a/}	-	-	163.2	496.7	774.3	926.6	1076.9	1124.3	1268.1	1379.4	
By-Products	1.00	-	-	1.0	8.0	14.0	17.0	17.0	17.0	17.0	17.0	
TOTAL INFLOW		-	-	164.2	504.7	788.3	943.6	1093.9	1141.3	1285.1	1396.4	
NET CASH BALANCE		-207.9	-1455.6	-35.9	194.7	368.9	499.4	648.1	695.5	839.3	950.6	

a/ Depending on the Local sales/Exports ratio

Source: MEMRB, 1987. A feasibility study for the Agros Winery.
Own calculations.

Appendix Table 3. Cashflow analysis of farm roads (CE/km).

	Year																Internal Rate of Return %	Net Pre- sent va- lue at 9% CE
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16-20		
CAPITAL EXPENDITURE^{a)}																		
Financial including labour	3000																	
Financial excluding labour	3000																	
Economic including labour	3300																	
Economic excluding labour	3300																	
RECURRENT EXPENDITURE^{b)}																		
Financial including labour	-	100	100	100	100	100	100	100	100	100	200	200	200	200	200	200		
Financial excluding labour	-	70	70	70	70	70	70	70	70	70	140	140	140	140	140	140		
Economic including labour	-	90	90	90	90	90	90	90	90	90	180	180	180	180	180	180		
Economic excluding labour	-	60	60	60	60	60	60	60	60	60	120	120	120	120	120	120		
INFLOW^{c)}																		
Financial including labour	-	830	850	870	900	925	960	1000	1050	1100	1160	1200	1280	1280	1280	1280		
Financial excluding labour	-	210	215	220	225	230	240	250	260	275	290	300	320	320	320	320		
Economic including labour	-	810	830	850	875	900	935	970	1020	1075	1130	1170	1245	1245	1245	1245		
Economic excluding labour	-	185	190	195	200	205	215	220	230	245	260	270	285	285	285	285		
NET CASH BALANCE																		
Financial including labour	-3000	730	750	770	800	825	860	900	950	1000	960	1000	1080	1080	1080	1080	27.1	5050
Financial excluding labour	-3000	140	145	150	155	160	170	180	190	205	150	160	180	180	180	180	0.8 ^{d)}	0.0
Economic including labour	-3300	720	740	760	785	810	845	880	930	985	950	990	1065	1065	1065	1065	24.3	4627
Economic excluding labour	-3300	125	130	135	140	145	155	160	170	185	140	150	165	165	165	165	0.0 ^{d)}	0.0

Source: M. Economides, Land Consolidation Authority, (LCA) Ministry of Agriculture and Natural Resources.

Own calculations.

- a) it includes construction costs
b) it includes maintenance and foregone income from vines withdrawn due to constructions works
c) It includes time saved by the farmers when visiting their plots, decrease of uncultivated land (access to all plots) and decrease in machinery costs
d) low because most benefits are derived from labour saved.

Note: Based on LCA experience from schemes in the Vines region an additional 1800 km of farm roads are required to reach the optimum coverage for the five viticultural zones i.e 250 km in Mountains, 200 km in Commandaria, 450 km in Krasokhoria, 650 km in the Vines Paphos and 250 km in the Semi-mountain.

Appendix Table 4 Rate of change of per capita on and off-farm income between 1975/77-1985 and 1981-85 periods by viticultural zone.

	MOUNTAIN					COMMANDARIA					KRASOKHORIA					VINES PAPHOS/SEMI-MOUNTAIN				
	Amount (CE)			Rate of change (%)		Amount (CE)			Rate of change (%)		Amount (CE)			Rate of change (%)		Amount (CE)			Rate of change (%)	
	1975-1977	1981	1985	1975 / 77-85	1981-85	1975-1977	1981	1985	1975/ 77-85	1981-85	1975-1977	1981	1985	1975/ 77-85	1981-85	1975-1977	1981	1985	1975/ 77-85	1981-85
Per capita																				
On-farm income	61	200	271	16.0	7.9	100	256	464	16.6	12.6	120	456	516	15.7	2.5	214	673	1076	17.5	9.8
Off-farm income	74	450	764	27.6	14.1	54	376	652	28.3	11.6	40	217	484	28.3	17.4	33	118	542	32.3	35.6
Family income	135	650	1035	22.6	12.3	154	632	1116	21.9	12.0	160	673	1000	20.0	8.2	247	791	1618	20.7	15.4
Gross Domestic Product	582	1409	2630	16.3	13.3	582	1409	2630	16.3	13.3	582	1409	2630	16.3	13.3	582	1409	2630	16.3	13.3
Off-farm income as % of Family income	54.8	69.2	73.8			35.1	59.5	58.4			25.0	32.2	48.4			13.3	14.9	33.5		
Family income as % of Gross Domestic Product	23.2	46.1	39.4			26.4	44.8	42.4			27.5	47.8	38.0			42.4	50.1	61.5		

Source: Compiled on the basis of surveys carried out by the Agricultural Economics Section of the Agricultural Research Institute and the Economic Reports for the years 1975-77, 1981 and 1985.

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