LMC INTERNATIONAL

Study On The Cotton Sector

In The European Union

Final Report

Prepared for:

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Executive Summary

The objectives of this study are threefold, to:

- Assess the impact of the changes implemented in the cotton regime in 2006 on cotton production and the relative profitability of cotton vis-à-vis alternative crops;
- Assess the impact of the reform in the regime on the ginning industry; and
- Assess the impact of different policy scenarios on producers and ginners.

THE EU COTTON REGIME

The Common Market Organisation for cotton was introduced in 1981 with the accession of Greece to the Community and the CMO (the "cotton regime") was extended in 1986 with the accession of Spain and Portugal.

Protocol 4 established the Community support programme for cotton. According to the Protocol, the support system is intended "particularly to support cotton in the regions of the Community where it is important for the agricultural economy, to permit producers concerned to earn a fair income and to stabilise the market by structural improvements at the level of supply and marketing."

Principles

Prior to the reform approved in 2004 (which was first put into effect in 2006), the basic principles of the regime were that:

- Producers received a minimum price per tonne for unginned cotton.
- This price comprised an unginned cotton price, which was derived from the world ginned cotton market price, plus a payment from the EC.
- The payment from the EC was made to ginners, who transmitted it to growers.
- When cotton production exceeded certain reference levels, a stabiliser mechanism was applied which reduced the minimum price with a view to lowering grower prices and hence discourage over-production.

In 2003, the Mid-Term Review of the Agenda 2000 Reforms provided a far-reaching general reform of the Common Agricultural Policy (CAP). The guiding principle was a move away from price support and production support for specific crops to one of direct support for farmers' incomes. The cotton regime was bought into line with the other sectors of the CAP in 2004 and the reforms were introduced in 2006.

Following the reform, the Aid was transformed from one based on price supports to one relying on an area payment, which was partially decoupled. The decoupled component (65% of the total Aid[1]) was paid irrespective of the farmer's production decision, while

[1] The Spanish Government took advantage of the option, under Article 69 of Regulation 1782/2003, to reduce the decoupled payment by 10% and add it to the coupled payment.

the coupled payment was triggered by the opening of the cotton boll rather than the harvesting of the seed cotton.

The split between coupled and decoupled payments is summarised in Table EXEC 1.

Table EXEC 1: Cotton Area Payments in 2006 (€/hectare)

	Base Area ha	Decoupled Payment 65%	Coupled Payment 35%
Greece [1]	370,000	966	594 - 342.85
Spain	70,000	1,358[2]	1,039
Portugal	360	1,202	556

Note: 1. For Greece €594 per hectare is payable on 300,000 hectares and €342.85 on 70,000 hectares.
2. The decoupled payment for Spain was reduced below 65% because 10% of the decoupled payment was replaced by a coupled payment. This was permitted under Article 69 of Regulation 1782/2003

Source: DG Agri.

The reformed cotton regime was challenged by the Spanish Government, and following the Court of Justice finding against the EC, the Court annulled the reform. The Court found against the EC due to a breach of the principle of proportionality. In particular, the Court found in Spain's favour on two grounds:

- The EC failed to carry out an impact study; and
- The EC failed to include direct labour costs in the calculations.

The system was allowed to continue to operate until a new regulation was drawn up.

Regime Expenditure

Under the old regime, EC expenditure on the regime comprised two components:

- Aid to the growers; and
- An administrative fee paid to the ginners (of €53.1 per tonne, unginned cotton).

Expenditure on cotton aid had a floor of €770 million. During periods when this level of expenditure would not otherwise have been reached, a higher price was paid to growers. This occurred in 1996, 1998 and 2001.

Expenditure peaked at €952 million in 2005. Between 2001 and 2005, the annual average amount paid to growers was €761 million, while the administrative fee paid to the ginners averaged €78.3 million.

Under the reformed regime introduced in 2006, the total aid targeted at cotton growers was set at €803 million, based on the average budget spent on production aid over the reference period (2001 to 2003).

This budget was allocated in the following manner: rural development €22 million, decoupled aid €502 million and coupled aid €275 million. The balance of €4 million was to be used to assist the creation of Inter-branch Organisations. The ginners do not receive any of the Aid.

METHODOLOGY

In order to analyse the regime, we use a methodology based on gross margins (the difference between revenue and variable costs). We focus on two measures: (a) the gross margin (excluding family labour) per hectare, because this is the preferred method of measuring profitability citied by growers[2], and (b) the return per hour of family labour (gross margin divided by the amount of family labour).

We have based our estimates of family labour time on FADN data, which is a source that provides data across countries and crops. However, there are concerns regarding the reliability of these data. This arises from the nature of family labour; for instance, if a farmer's sole employment is in farming, the full year's labour time will be allocated to it, while in reality only a proportion of labour time is actually be spent on agricultural tasks. Accordingly, the FADN estimates are likely to overestimate the amount of time spent on a particular crop[3] and conversely underestimate the return to labour. In addition, there appear to be inconsistencies between the bases on which estimates were prepared of labour use for the same crops in different member states.

The major data sources analysed for this study are: (a) FADN data for farms specialising in cotton and the major competing crops; (b) a questionnaire undertaken of a sample of producers and ginners; (c) private data sources (a database of farm costs for Spain and financial returns from the Greek ginning industry); and (d) official data from governments and industry associations.

THE EU COTTON SECTOR

Cotton Production

Cotton is produced in four EU-27 states, namely Greece, Spain, Portugal[4] and Bulgaria. Production is dominated by Greece and Spain.

The EU-15 cotton area grew steadily until the end of the 1990s, peaking at almost 540,000 hectares in 1999/2000. Since then the area under cotton has stabilised at 450,000 hectares (Diagram EXEC 1).

Greece is the largest producer in the Community and there are 79,700 farmers involved in cotton farming; these are concentrated in Anatoliki Makedonia, Kentriki Makedonia, Thessalia and Sterea Ellada. Cotton accounts for 9.1% of final Greek agricultural output. The majority of farmers grow between 2 and 5 hectares of cotton.

Cotton is cultivated on some of the best agricultural land. The main competing crops are cereals, particularly durum wheat[5] and maize. Over 99% of Greek cotton production is grown using irrigation.

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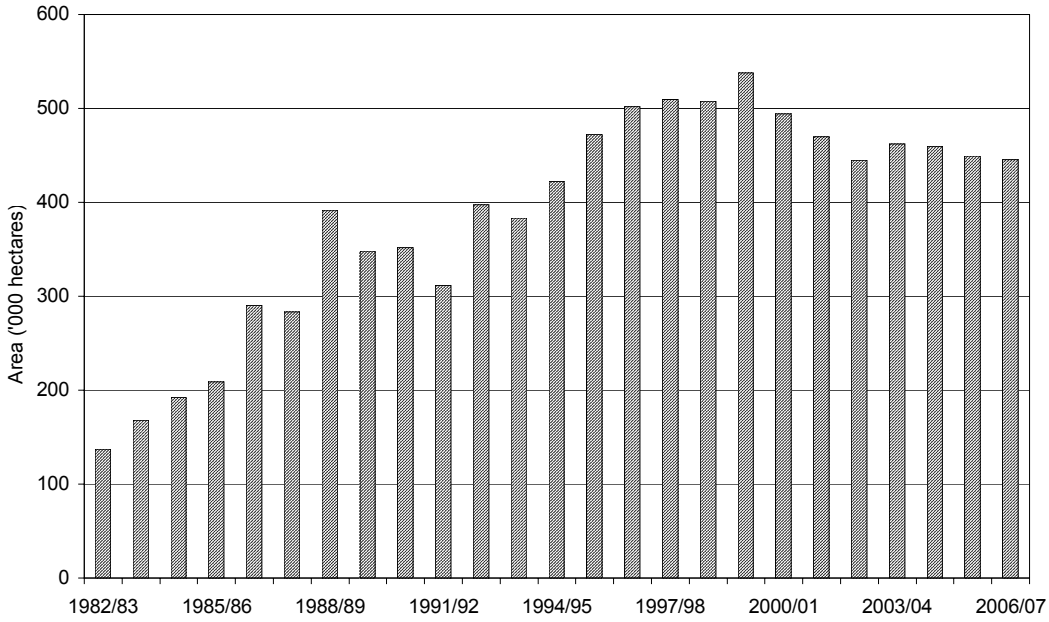
[2] In the questionnaire growers were asked how they measure profitability. The most common response in both Greece and Spain was (revenue minus cash costs).

[3] This is confirmed by the questionnaire data where farmers where asked about the amount of time spent in practice on specific agricultural activities.

[4] With only small volumes produced in Portugal, unginned cotton was sent to Spain for ginning.

[5] Following the cereal reform in 2006, the area under soft wheat has increased in both Spain and Greece, often at the expense of durum wheat. This is because the old cereal regime favoured durum wheat.

Diagram EXEC 1: EU Cotton Area



Note: Spanish data are only included from 1986/87 with its accession to the EU.
Source: DG Agri, National Authorities

Andalucia accounts for 98% of cotton output in **Spain**. 9,500 farmers in the region are cotton producers. Cotton accounts for 1.3% of final Spanish agricultural output. Within Audalucia cotton accounts for 4.9% of final agricultural output, and is particularly important in Sevilla (11.2%), Cadiz (5.9%) and Cordoba (3.2%).

Most Spanish farmers grow under 10 hectares of cotton, but 5% of the cotton farms cultivate over 50 hectares of cotton. Competing crops include: wheat, maize, sunflower and sugar beet. Over 95% of production is produced under irrigated conditions.

In both countries, cotton is a large user of family labour. FADN data imply that cotton requires more hours of labour per hectare than major competitors (Table EXEC 2). The findings of the questionnaire suggest that FADN data overstate the hours spent on cotton production, but that cotton is still the most important user of household labour.

Table EXEC 2: Family Labour Use (hours per hectare per annum)

	Cotton	Durum Wheat	Maize	Sunflower
Makedonia	195	79	194	
Thessalia	220	98	194	
Spain	182	134	103	60

Note: Data collected from the questionnaires puts cotton household labour use lower than that of FADN. For Greece, household labour use varied from 75 to 90 hours per hectare, while in Spain household labour use varied from 23 to 60 hours per hectare.

Source: FADN.

Cotton Ginning

The ginner purchases unginned cotton from farmers and processes it into ginned cotton and cottonseed. In both Greece and Spain, the ginners are specialists and derive most of their income from ginning and related activities. In Greece, a number of ginners also crush cottonseed to produce cottonseed oil and meal.

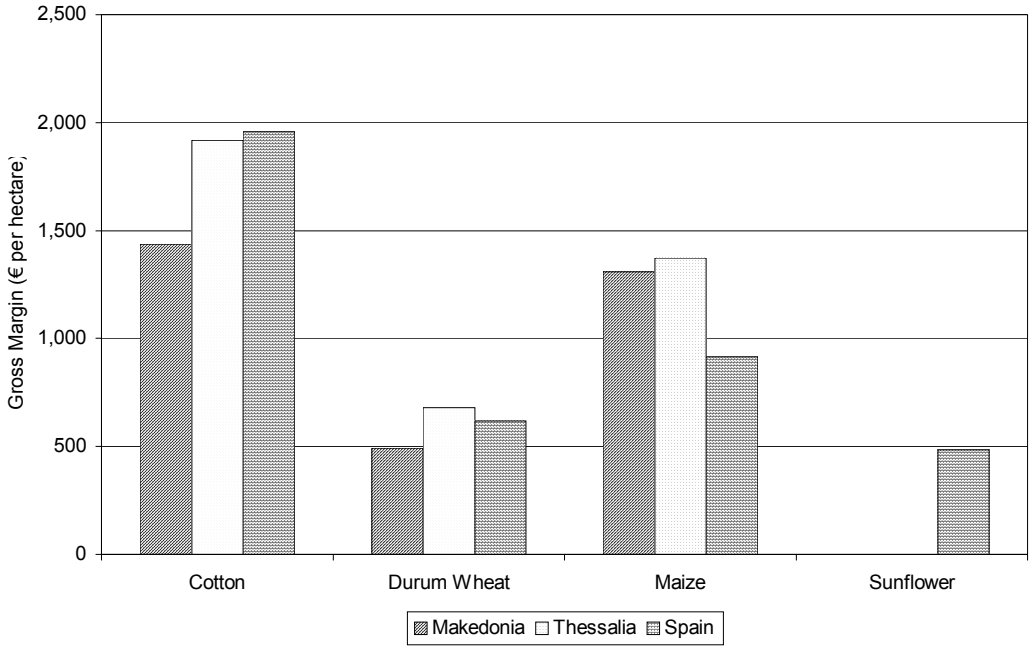
73 ginning mills were active in Greece in 2005/06. On average, each Greek ginning mill employs 10 permanent and 30 seasonal workers; this suggests that total employment in the sector is almost 3,000 workers (730 full time and 2,200 part time).

Out of a total of 29 ginning mills, 27 were active in Spain in 2005/06 prior to the reform. In 2004, total employment in the Andalucia cotton-ginning sector (accounting for 85% of gins) was 1,170 workers, comprising 250 permanent and 920 seasonal workers (equivalent to 11 permanent workers and 40 seasonal workers per mill on average). Scaling up the Andalucia figures pro rata to its share of national gin numbers, the Spanish total employment in cotton ginneries was estimated at 1,350 workers, divided between 290 permanent and 1,060 seasonal employees.

COTTON REGIME PRE-REFORM

The old cotton regime was based on a per tonne payment for unginned cotton which encouraged a high input-high output system with high agricultural yields. Under this regime, cotton had the highest gross margins and returns per day of family labour of the major crops competing for potential cotton farming land (Diagram EXEC 2). Following the changes to the regime in 2000, the level of profitability was such that the incentives were sufficient to maintain production rather than expand it (Table EXEC 3). This is in contrast to previous regimes, under which production continued to expand.

Diagram EXEC 2: Gross Margin Cotton vs. Alternative Crops Pre-2006 Reform



Source: LMC estimates

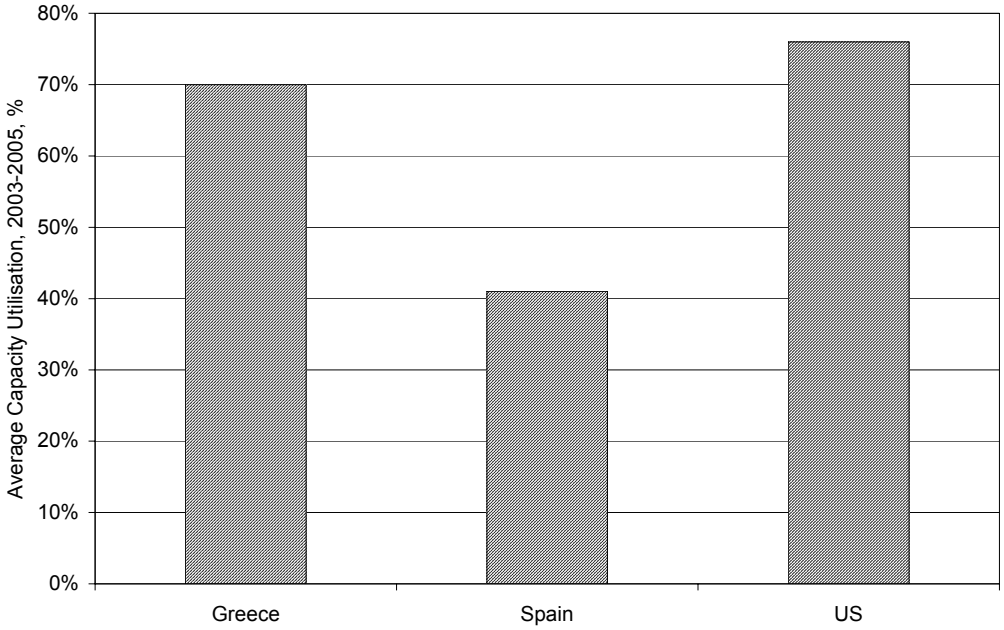
Table EXEC 3: Cotton Area and Production, Pre-2006 Reform

	2003	2004	2005
Greece			
Area (ha)	367,472	369,500	363,000
Production (tonnes)	1,006,248	1,137,229	1,124,714
Yield (t/ha)	2.7	3.1	3.1
Spain			
Area (ha)	94,999	90,297	86,058
Production (tonnes)	305,417	368,097	355,482
Yield (t/ha)	3.2	4.1	4.1

Source: DG Agri.

Prior to the regime change that was implemented in 2006, there was overcapacity in the ginning industry. On a standardised basis[6], capacity utilisation in Greece was estimated at 70% in 2003-2005, while in Spain capacity utilisation was estimated at 41%. In the US capacity utilisation is estimated around 75% (Diagram EXEC 3).

Diagram EXEC 3: Comparison of Average US and EU Ginning Capacity Utilisation Rates, 2003-2005



Source: LMC estimates

There are a number of reasons that led to this overcapacity:

[6] The number of days of operation of the gins and hours worked per day varies considerably by country and company. In order to provide an objective measure of capacity, we have calculated capacity on the basis of US industry parameters (an 81 day season with an average operating time of 17.5 hours). This puts total ginning capacity at 0.86 million tonnes unginned cotton in Spain and 1.60 million tonnes unginned cotton in Greece.

- Ginning was profitable which encouraged its expansion. Profit as a proportion of revenue averaged 14% in Greece and 19% in Spain in 2004 and 2005.

- Ginning unit costs were high by international standards, partly as a result of over capacity. High costs were absorbed via the cotton regime, for two reasons:

  — The unginned cotton price (which determined the payment of aid) was set at a level between 20.6% and 24.4% of the international price for ginned cotton[7]. For the ginner, this yielded a margin that equalled the difference between the sales price for ginned cotton and the calculated unginned cotton price. This margin had little relationship to an estimate of efficient ginning production costs.

  — The administrative element of the Aid was greater than the cost of administering the scheme; hence, this component provided an implicit subsidy to the ginners.

- In Greece, the high cotton prices seen during the period of 1995-1999 stimulated Turkey to expand its textile production, and in turn, Greece expanded its cotton production. By 2000, Greek ginners had expanded processing capacity to meet the demand for more cotton. Production however, did not increase further.

THE REFORM OF THE COTTON REGIME

The change in the cotton regime to a partially decoupled area-based system and the decoupling of the cereal regime[8] have led to a fall in gross margins[9] for producers of both of these crops (total farm incomes were not affected in the same manner, since decoupled payments were increased alongside the reductions in price supports).

The reactions of producers to this changed situation were very different in Spain and Greece (Diagram EXEC 4).

- Both the area under cotton and yields fell sharply in Spain (by 45% and 27%, respectively).

- In Greece, by contrast, the area under cotton rose by 4%, while average yields fell in Greece (by 24%).

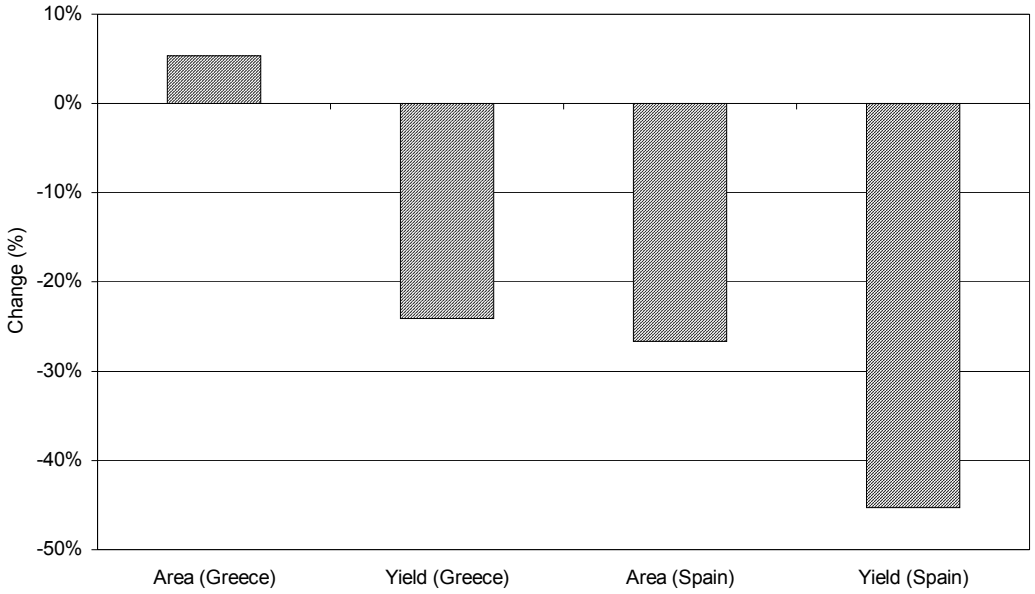
- The decline in yields in Greece was caused by poor weather, and was not the consequence of regime change.

[7] The actual amount varied according to the underlying world price.

[8] In Greece, cereals were fully decoupled, while in Spain 25% of the support remained coupled.

[9] In the calculation of gross margins, we do not include the decoupled payment, since this does not affect returns when producers make their crop choices at the margin.

Diagram EXEC 4: Change in Area and Yields, 2006 vs. 2005



Source: DG Agri

In **Spain**, following the change in the regime, producers faced a number of production options:

1. To maintain production using traditional production techniques with high input use and high yields (of around four tonnes per hectare);

2. Reduce input use (and per hectare production costs) and then claim an agri-environmental payment, which is paid in addition to the income from the market-determined cotton price and the coupled aid.

3. Reduce input use, but not claim the agri-environmental payment, because of the bureaucratic procedures that have to be followed to receive the payment.

4. Reduce inputs to a minimal level, but a level just sufficient to receive the coupled payment. In this case, farmers only harvest the cotton if the revenue from cotton sales is sufficient to cover harvesting and transport costs.

5. Switch out of cotton to alternative crops. Our analysis is based on the assumption that farmers would switch to durum wheat, maize or sunflower. These crops have historically been considered to be the main alternatives by farmers. Another alternative, which has become an option following the reform of the cereals regime[10], is soft wheat. However, in our analysis, at least for the first year following the regime, we discount soft wheat as an option, since cotton farmers' experience is overwhelmingly with growing durum wheat, rather than soft wheat. This practical constraint upon switching to soft wheat would be expected to weaken in the longer term.

[10] This has occurred because, under the old cereals regime, substantial additional payments were made to growers of durum wheat in traditional areas.

Following the reform, the gross margin in Spain for cotton is found to be higher than that earned on the main alternatives when agri-environmental payments are received (Diagram EXEC 5). Although these payments are independent of the cotton regime, they have proved to be an important part of the farmers' decision-making process and the area that qualified for the payment increased dramatically in 2006 (from 20,000 to 50,000 hectares). For farmers who received these payments, the area under cotton was largely maintained at 2005 levels, albeit with a less intensive production system (yields have fallen by over 40% to approximately 2.5 tonnes per hectare).

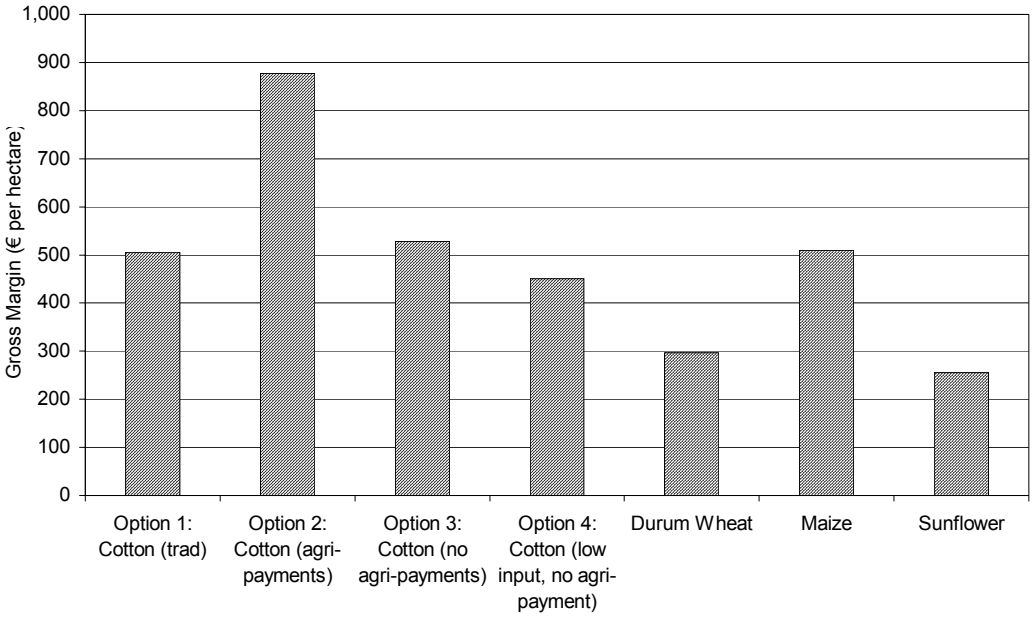
For farmers who did not receive the agri-environmental payment, the area under cotton fell dramatically (to 14,000 hectares) as farmers switched to more profitable alternatives, notably maize, but also other crops such as citrus, olives, etc.

Even where production has been maintained without the agri-environmental payment, the questionnaire responses suggest that yields have fallen. This is in line with the analysis of gross margins (Diagram EXEC.5) which suggests that gross margins are higher for a system with lower inputs (Option 3) than one with higher inputs and high yields (Option 1).

Where yields are reduced further by operating a low input-low output cotton farming system (Option 4), the gross margins fall further. However, in practice, some Spanish cotton producers are reported to have switched to this option. This option has the attraction of affording the least risk to producers, while also requiring the smallest cash outlay.

Returns per day of family labour under Option 4 prove to be slightly higher than those with Option 3. Under Option 4, if yields are low enough, it can also be advantageous for the farmer not to harvest cotton and accept the coupled payment on boll opening.

Diagram EXEC 5: Spain, Gross Margins for Cotton vis-à-vis Competing Crops, After Reform

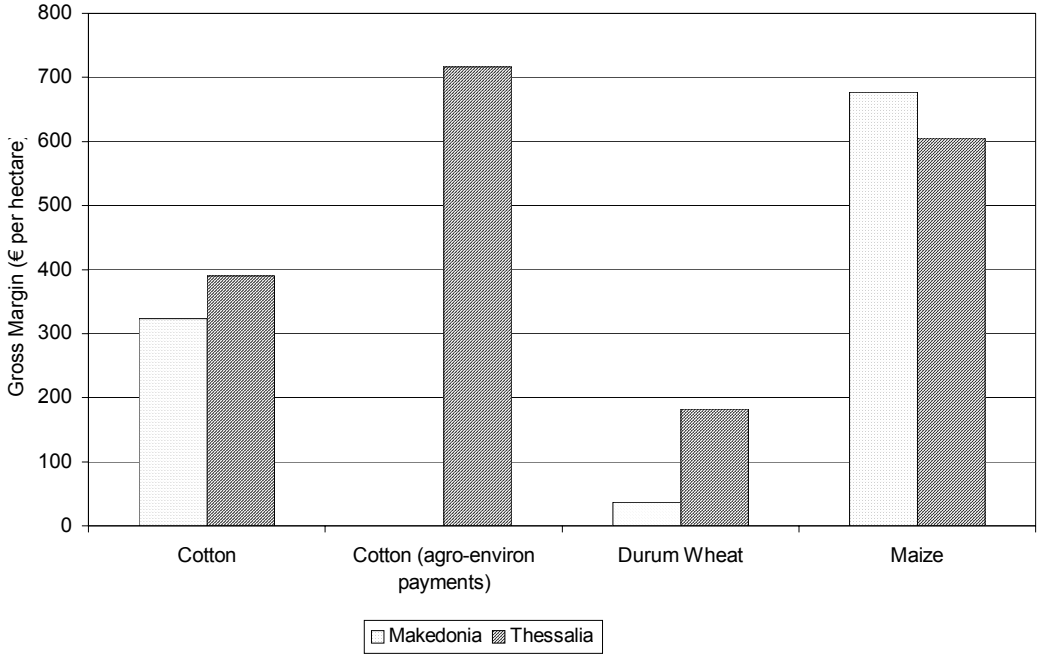


Source: LMC estimates

In **Greece** producers reacted much less than in Spain to the reform and the area under cotton actually rose in 2006. This was partly because returns to other crops have fallen with the full decoupling of the cereal regime. The returns to durum wheat, which is considered the main alternative crop by producers, are below those of cotton (Diagram EXEC 6). The anomaly is maize, which in some cases yields a higher gross margin than cotton, and yet producers did not switch to it. In the short run, this is due to technical and economic factors, such as the nature and timing of irrigation. In addition, there is a degree of inertia among Greek producers. The size of farms is relatively small and it is expected to take longer for producers to switch to alternative crops.

As with Spain, returns to producers receiving agri-environmental payments are higher than for alternative crops. However, these payments are only available in Thessalia and there has been no increase in the overall crop area receiving these payments.

Diagram EXEC 6: Greece, Gross Margins to Cotton vis-à-vis Competing Crops, After Reform



Source: LMC estimates

With lower production, **ginning** capacity utilisation fell to 17% in Spain. In Greece capacity utilisation fell to 56%, but this was more a reflection of the effect of poor weather than the change in the regime. With more normal weather conditions, capacity utilisation would have remained close to 70%.

The regime change has also made a difference is in terms of **quality**. The quality of unginned cotton from the 2006 crop was poor in both Greece and Spain. Some diminution of quality was a result of bad weather in Greece, but the greatest impact came as a result of poorer farm management. Lower fertiliser and irrigation application rates in Spain resulted in shorter fibre length; also many farmers did not defoliate before harvesting, which increased the amount of leaf impurities reported in the unginned cotton. Another factor that has acted to reduce the quality of both Greek and Spanish cotton in recent years, but which is not related to the new regime, is the increasing use of stripper harvesters.

IMPACT OF CHANGING THE COTTON REGIME

The impact of three alternative sets of measures is contrasted. These measures are:

- A return to a deficiency payment system;
- The 2004 reform, but with the possibility of varying the share of decoupling; and
- Full decoupling.

The Deficiency Payment System

This refers to a system where aid is paid per tonne of unginned cotton. This is the same as the measures in effect prior to the reform. To analyse the outcome of this system, we examine the gross margins that existed prior to the reform for cotton with those of the main competing crops. Under this system, the gross margins and returns per day for cotton were considerably higher than those of other crops and we would expect the area under cotton and yields to remain at pre-reform levels (these are listed in Table EXEC.3, above).

The 2004 Reform, Implemented in 2006

Following the reform, returns to cotton farmers in 2006 changed from a single payment made by ginners, including the Aid, to a payment from ginners (based on world prices) plus a cotton area payment (the coupled payment). The effects of the reform are discussed above. Under the reform, the area under cotton and yields declined in Spain, but the area was unchanged in Greece (the fall in yields in Greece in 2006 was due to climatic factors, rather than the reform). For the gins, capacity utilisation fell in Spain, but would have remained unchanged in Greece with normal weather (Table EXEC.4).

In the absence of additional agri-environmental payments in Spain, the area under cotton would have fallen further in 2006. In this case, if we assume that farmers who had received the payment would have behaved in the same way as those who did not receive the payment, the area under cotton would have fallen to 33,800 hectares in 2006 (which compares with the actual planted area of 63,100 hectares that year).

Table EXEC 4: Cotton Area and Production, 2004 Reform Scenario

	Reform Scenario	No increase in agri-payments
Greece		
Area (ha)	362,000	
Production (tonnes)	1,122,200	
Yield (t/ha)	3.1	
Capacity Utilisation	69%	
Spain		
Area (ha)	63,119	33,783
Production (tonnes)	164,109	87,835
Yield (t/ha)	2.6	2.6
Capacity Utilisation	19%	10%

Note: Spanish yields are based on questionnaire responses.

Source: LMC

We are able to model the impact of changing the regime by making use of the observed responses in 2006 (for Spain) and an analysis of the questionnaires prepared for this report. In the questionnaires, farmers were asked what would be the effect of changes to the coupled payment on their planted areas. The results are presented in Tables EXEC.5 and EXEC.6.

As the level of coupled payment falls, so the gross margin for cotton falls and producers switch to alternative crops. In the case of Spain, a 30% (or €300 per hectare) fall in the coupled payment would lead to a reduction in the planted area of 17,000 hectares. In the absence of agri-environmental measures, the same reduction in the coupled payment would reduce the planted area to 10,000 hectares.

In terms of production, under the reform's system of coupled payments, gross margins are always higher for the medium level input system (Options 2 and 3) than with a high input system (Option 1); hence, average Spanish yields would be expected to remain around a level of 2.6 tonnes per hectare.

For some Spanish producers, a low input-output system (Option 4) may be more advantageous, and this would reduce yields further. Under this low intensity system, the incentives are for producers to reduce costs as much as possible in order to maximise the gross margin, since the trade-off between higher inputs and higher yields does not favour higher inputs.

For the Spanish gins, the medium level input options (Options 2 and 3) would mean that capacity utilisation never rises above 25% (Table EXEC.5).

In Greece, a 30% (or €160 per hectare) fall in the coupled payment would reduce the cotton area by 100,000 hectares. In terms of production, the reform's coupled payments always leaves gross margins higher for the high input-high output system, and hence yields remain around 3 tonnes per hectare.

For the Greek gins, a 30% fall in the coupled payment would reduce capacity utilisation to 49% (Table EXEC.6).

Table EXEC.5: Spain, the Impact of Changes in Coupled Payments on the Sector

Change in Coupled Payment	Coupled Payment € per ha	Total Area (hectares)	Production (tonnes unginned cotton)	Capacity Util %	Area (no agri-env payments) (hectares)	Production (tonnes unginned cotton)	Capacity Util % .
+ 50%	1,559	82,625	214,825	25%	77,875	202,475	24%
+ 40%	1,455	80,539	209,401	24%	72,934	189,629	22%
+ 30%	1,351	77,497	201,493	23%	65,787	171,045	20%
+ 20%	1,247	73,416	190,881	22%	56,333	146,465	17%
+ 10%	1,143	68,478	178,042	21%	45,208	117,540	14%
0%	1,039	63,119	164,109	19%	33,783	87,835	10%
- 10%	935	57,540	149,604	17%	23,578	61,304	7%
- 20%	831	51,809	134,704	16%	15,540	40,404	5%
- 30%	727	45,515	118,339	14%	9,812	25,511	3%
- 40%	623	38,193	99,302	12%	6,015	15,639	2%
- 50%	520	29,892	77,720	9%	3,618	9,406	1%

Source: Chapter 5.

Table EXEC.6: Greece, the Impact of Changes in Coupled Payments on the Sector

Change in coupled payment	Coupled Payment € per ha	Area 000 ha	Production 000 tonnes	Yield T/ha	Capacity Util (%)
+ 50%	794	494	1,554	3.1	96%
+ 40%	741	470	1,474	3.1	91%
+ 30%	688	445	1,393	3.1	86%
+ 20%	635	410	1,280	3.1	79%
+ 10%	582	379	1,178	3.1	73%
0%	529	362	1,123	3.1	70%
- 10%	476	320	990	3.1	61%
- 20%	423	295	908	3.1	56%
- 30%	370	262	798	3.0	49%
- 40%	317	241	729	3.0	45%
- 50%	265	220	660	3.0	41%

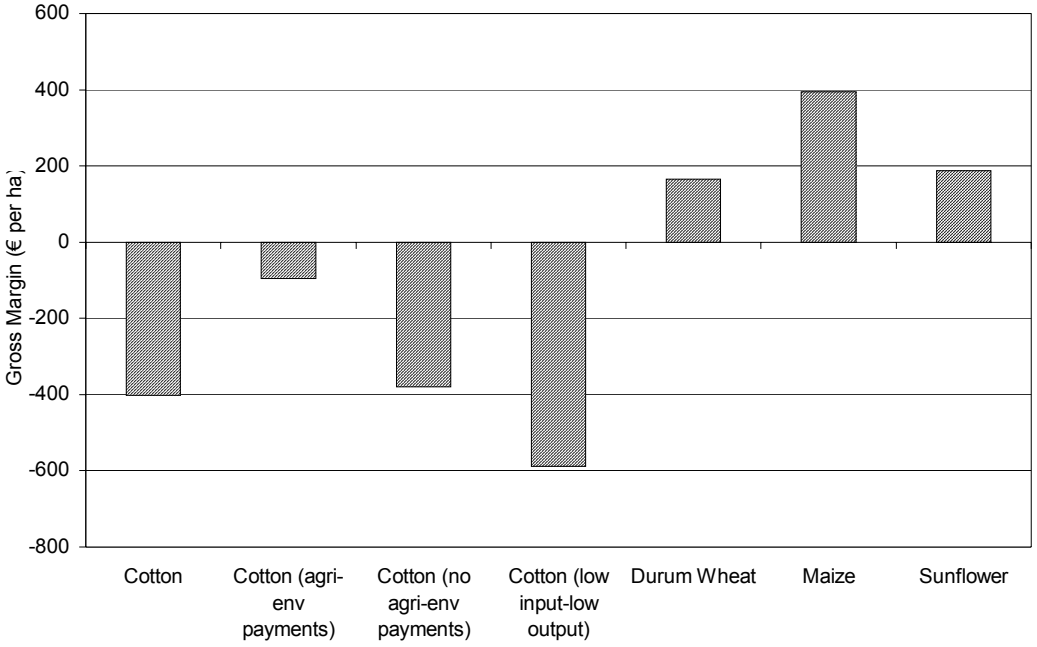
Source: Chapter 5.

Full Decoupling

With full decoupling, where we assume that cereals are also fully decoupled, margins for cotton in Spain turn negative (Diagram EXEC 7). Thus we would expect the area under cotton to fall to zero.

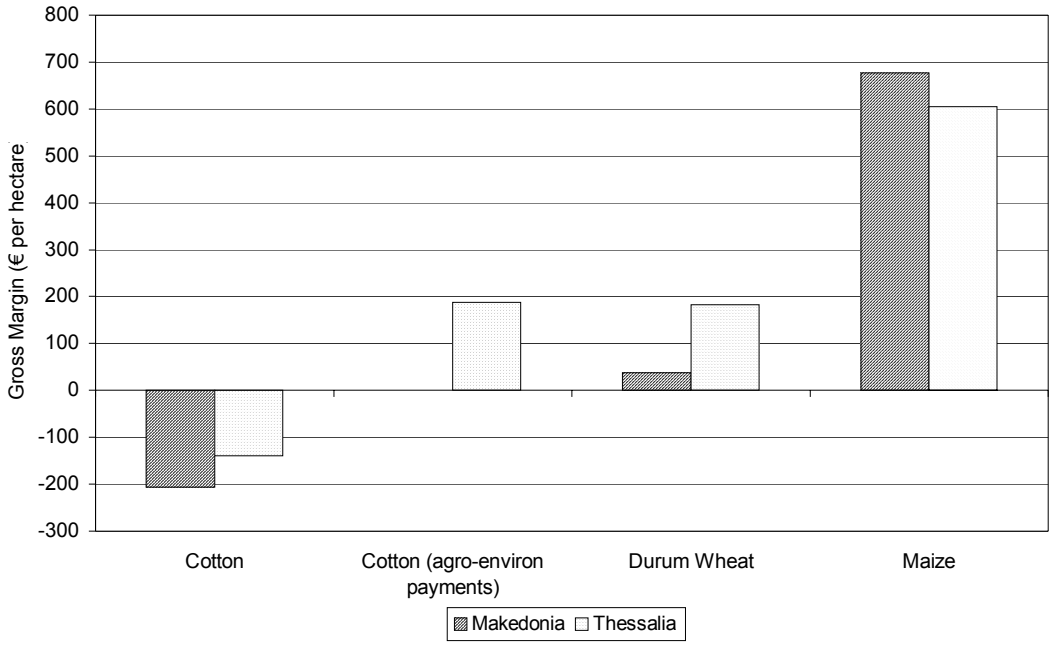
In Greece cotton margins turn negative except where agri-environmental payments are made (Diagram EXEC 8). We would expect the cotton area to decline in the first instance to the area that receives these payments, at present this amounts to 93,000 hectares, all in Thessalia. Over time, some cotton areas would switch to maize.

Diagram EXEC 7: Gross Margins with Full Decoupling in Spain



Source: LMC estimates

Diagram EXEC 8: Cotton vis-à-vis Competing Crops, Full Decoupling, Greece



Source: LMC estimates

OBSERVATIONS

With regard to the reform of the regime and options for change, our analysis suggests:

- The outcome of the reform, at least in the short run, has been markedly different in Greece and Spain. In Spain the area under cotton has contracted while in Greece it has been maintained. There are a number of reasons that account for the inertia in the Greek industry. While our analysis is based on just one year's observations, in the longer term, we would expect to see the cotton area in Greece contract, in view of the higher gross margins for competing crops.

- The speed with which farmers switch between crops depends upon the gross margin, which is a function of both prices and costs. Our analysis in based on the prices that faced producers on planting in 2006. Over time, prices change. For instance, a rise in cereal prices relative to cotton (such as occurred between the time when planting decisions were being made for the 2006 and 2007 crops) would push gross margins further in favour of cereal production and the cotton area would be expected to contract.

- Under a fully decoupled system where a free market for cotton exists, the gross margin for cotton is negative in all but one case. Growers would be expected to switch to alternative crops and there would be much less cotton production in Europe. The only exception is the case where agri-environmental payments are made in Greece, which maintains a positive gross margin for cotton.

- Under the current system, in effect in 2006, gross margins on cotton are highest when agri-environmental payments are received. This is not the intention of the agri-environmental scheme. It suggests that the level at which these payments are set is too high. This is largely because the level of payment was determined before the reform, a time when gross margins for cotton production were higher.

- At present the scheme is based on the payment of the coupled payment on boll opening rather than harvest. For some producers in Spain, the optimal production decision is to move to a low input-low output system without harvesting. This option has lower costs per hectare and producers face less risk than under the other cotton options.

- The discovery that a low input-low output system without harvesting can be an optimal production response for some producers points to a sub-optimal incentive structure that does not lead to the maintenance of the ginning industry, which is essential to the long term viability of the industry. A system of coupled payments implies that cotton production is a desired objective, yet the payment on boll opening contradicts this view, as there is no requirement to harvest that cotton.

- There is over-capacity in the ginning sector. This existed prior to the adoption of the reform, but has been amplified by the reduction in production following the reform, particularly in Spain. Our calculations of capacity assume that total capacity remains constant, however, in reality, faced with such low levels of utilisation the sector would be expected to contract. In order to ensure the long term viability of the industry, ginning capacity needs to be rationalised. Measures could be considered to ease this transition.

Introduction

The objectives of this study are to:

- Assess the impact of the change in cotton regime on cotton production and the relative profitability of cotton vis-à-vis alternative crops;
- Assess the impact of the regime change on the ginning industry; and
- Assess the impact of different policy scenarios on producers and the ginning industry.

The study contains seven chapters and six appendices.

Chapter 1 presents an overview of the EU cotton regime since its inception with the accession of Greece to the EU in 1981.

Chapter 2 describes the methodology adopted to conduct this study. This is based on an analysis of gross margins.

Chapter 3 describes the EU cotton sector and discusses the economies of cotton production both pre-and post cotton sector reform.

Chapter 4 describes the EU ginning sector and discusses the economies of cotton ginning both pre-and post cotton sector reform.

Chapters 5 and 6 reveal the impact of changes to the regime. Chapter 5 details the effect these changes would have on producers, while Chapter 6 discusses the impact on the ginning sector.

Chapter 7 presents some general conclusions.

Six appendices support the analysis. These present production cost data (Appendices 1 to 3), the results of a questionnaire amongst producers in Greece and Spain (Appendices 4 and 5) and a comparative analysis of the US ginning industry (Appendix 6).

Chapter 1: The EU Cotton Regime

This chapter describes the EU cotton regime which was introduced in 1981 with the accession of Greece into the European Community and expanded with the accession of Spain and Portugal in 1986. It describes the regime and its evolution since its introduction. Until the reforms of 2004 (which were first implemented in 2006), the main principles of the regime remained largely unchanged, although the scheme was revised six times.

This chapter:

- Examines the principles of the old regime; and
- Outline the changes that were introduced in 2006.

Protocol 4 established a Community support programme for cotton. According to the Protocol, the support system is intended "particularly to support cotton in the regions of the Community where it is important for the agricultural economy, to permit producers concerned to earn a fair income and to stabilise the market by structural improvements at the level of supply and marketing."

Paragraph 3 of Protocol No 4 provided that such a system 'shall include the grant of an aid to production', while Paragraph 11 of Protocol No 4, in its original version, both required the Council to review the operation of the support system for cotton and provided it with the *vires* to modify that system. It was on the basis of that paragraph that the Council modified the system since its original adoption.

THE REGIME PRIOR TO 2006

Basic Principles of the Regime

The basic principles of the regime were that:

- Producers received a minimum per tonne price for unginned cotton.
- This price comprised an unginned cotton price derived from the world market price plus a payment from the EC.
- The payment from the EC was made to the ginners, who then paid the growers.
- The level of payment from the EC was based on the difference between a "guide" price that was fixed by the Council and the world market price.
- Growers received a minimum price, which was computed as the guide price minus a permitted administrative cost which was claimed by the ginners.
- The guide price protected growers from fluctuations in the world price, but allowed the ginners to sell cotton fibre at prevailing world market prices.
- When cotton production exceeded certain reference levels, a stabiliser mechanism was enacted which reduced the guide and minimum prices with a view towards reducing grower prices and hence over-production.

Evolution of the Regime

1981 – 1985

Under the original scheme[1], the guide price was set annually by the Council and the world market price for unginned cotton was determined by the Commission. In the latter case, where price quotations were not available for unginned cotton, the world price was determined from the value of products obtained from ginning and estimated ginning costs.

Ginners applied for aid from the national authorities no later than the day on which the product entered their undertaking. To allow forward contracts to be negotiated, applications could be made before the product was physically available.

The minimum payment was based on a standard quality unginned cotton which was defined on the basis of its impurity and moisture contents, length and grade of fibres.

The guide price was limited to a maximum guaranteed quantity (MGQ) which the Council set. If production exceeded the MGQ, a stabiliser mechanism reduced the price actually paid to the growers and the aid they received. If the estimated production before the start of the cotton year was greater than the MGQ, the guide price was reduced by 1% for every 15,000 tonnes by which the MGQ was exceeded. In practice, the MGQ was set at 560,000 tonnes and was never exceeded.

1986 – 1991

With the accession of Spain and Portugal, among whom only Spain was then a producing country, the MGQ was increased to 752,000 tonnes with effect from the 1986/87 cotton year. In 1987/88[2], to protect growers from a large fall in the minimum price (due to production exceeding the MGQ), a cut off point was introduced below which the guide price could not be reduced. The cut off was initially set at 15% below the guide price, but later the maximum price reduction was raised to 25%.

There were a number of limitations to the scheme:

- Production always exceeded the MGQ between 1986 and 1991;
- Although the MGQ was set at 752,000 tonnes, it could be adjusted on the basis of the gap found between actual production and estimated production for the preceding year. Consequently, and despite the operation of a cut off point, the reduction in the guide price fluctuated between 6% and 25% each year;
- The quality of cotton produced in the Community was below the standard that formed the basis of the regime's measures determining prices. This was because the regulations did not take account of organic impurities and so producers had little incentive to produce clean cotton; and
- As aid was payable no later than the day in which the cotton was lodged, this meant that if ginners were unable to sell or hedge that cotton immediately, they were subject to the full risk inherent in fluctuating world prices.

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[1] Council Regulation (EC) 2169/81

[2] Council Regulation (EC) 1964/87

Under Regulation (EEC) No 1152/90 a system of aid for small producers (whose area did not exceed 2.5 hectares) was established. Its purpose was to compensate these producers for the falls in income brought about by the stabiliser mechanism. The aid was set at a level to compensate for the costs involved in hand picking cotton (this aid amounted to ECU 250 per hectare, but the area eligible for payments was limited to 73,000 hectares in order to ensure budget stability). When the area under cotton, exceeded this amount, the aid was reduced in proportion to the extent of the overrun.

1992 – 1995

In light of the limitations noted above, the operation of the regime was adapted[3]:

1. Annual fixing of the MGQ was abandoned in order to reduce uncertainty at sowing time.

2. The MGQ was no longer adjusted on the basis of the gap between actual and estimated production in the preceding year.

3. The 15,000 tonne tranches for establishing the reduction in the guide price were replaced by a coefficient that was calculated using the overrun on the MGQ.

4. Any reduction in the guide price, when actual production was higher than the MGQ, was limited to 20%. However, if the fall in the guide price should have been greater than 20%, any excess was carried over and thus served to reduce the guide price in the next cotton year. This was known as the "cut-off and carry over system".

5. The standard quality of unginned cotton was adjusted to take account of organic impurities.

6. Aid applications from ginners could now be lodged after the day in which delivery was made to the ginner.

Production continued to exceed the MGQ and guide price reductions were enacted. An objection that was made to the revised regime was that the uniform reduction in the guide price was felt to be unfair to Spanish growers whose production, in part due to drought, had not expanded, while Greek production continued to expand.

A further criticism of the measures was that the operation of the scheme for small producers led to a change in the production structure and an increase in the number of small farms.

1995 –2000

The regime was further revised in June 1995[4]. On the basis of the EU's internal demand for cotton fibre and taking account of the areas judged suitable for production, the MGQ was increased. At the same time, to ensure budget neutrality, the guide and minimum prices were reduced.

The MGQ was increased to 1,031,000 tonnes and, to ensure fairness between member states, a National Guaranteed Quantity (NGQ) was introduced for each producing country. If national production exceeded the NGQ then the aid was reduced

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[3] Council Regulation (EEC) 2052/92

[4] Council Regulation (EC) 1553/95 and 1554/95

proportionately in the country responsible for the excess. The NGQ was set at 782,000 tonnes for Greece and 249,000 tonnes for Spain. Other countries with cotton potential were permitted a quota of 1,500 tonnes.

Under the stabiliser mechanism, the price fell by 0.5% for every 1% by which actual production exceeded the NGQ. However, aid to the sector was required to be at least €770 million in magnitude. In the event of high international prices, when the level of aid per tonne was reduced, the reductions in guide price were moderated to ensure that the minimum level of budgetary expenditure was reached.

The guide price was set at €1,063.0 per tonne of unginned cotton and the minimum price at €1,009.9 per tonne. The required quality standards were that the cotton was:

- Of fair sound and merchantable quality;
- Having 10% moisture and a 3% impurity content;
- Having the necessary characteristics to produce, after ginning, 32% grade 5 fibres (white middling) of 28 mm length (1-3/32 inches).

The world market price for unginned cotton was determined by the Commission on the basis of the historical relationship between the world market price for ginned cotton and the calculated price for unginned cotton, rather than an estimate of production costs.

The world market price was based on the above quality standards, and an average of offers and quotes made at one or more European exchanges for a product delivered c.i.f. Northern Europe. The Cotlook “A” cotton price acted as a proxy for this price.

Under the revised scheme, the cut-off and carry over system was abolished. Aid was received when the cotton was ginned, but advance payments could be made when the unginned cotton entered the ginner’s undertaking, subject to the provision of adequate security by the ginner. The advance could not exceed 40% of the guide price. The balance was paid on ginning and before the end of the marketing year.

The scheme for small producers (Regulation (EEC) No 1152/90) was repealed.

Over the period production continued to be, on average, above the NGQ in both Spain and Greece and in 1999/2000, with low prices, budget expenditure rose to record levels. Portugal began cotton farming in 1997/98 and all its unginned cotton was processed by Spanish ginners.

2001 – 2005

A sixth amendment of the scheme was introduced in May 2001[5]. The regulation sought to simplify the system as the legislative arrangements where considered too complex. Consequently, paragraph 11 of Protocol 4 was repealed and replaced by an enabling provision (now paragraph 6 of Protocol 4). The paragraph stated that ‘the Council, acting by a qualified majority on a proposal from the Commission and after consulting the European Parliament, shall decide on the adjustments necessary to the system introduced pursuant to this Protocol and shall adopt the general rules necessary for implementing the provisions of this Protocol’.

[5] Council Regulation (EC) 1050/2001

At the same time, and on the basis of the new paragraph 6, Council Regulation (EC) 1051/2001 was adopted. Under the regulation:

1. The guide price and minimum prices were maintained at their previous levels. The NGQ was maintained at 782,000 tonnes for Greece and 249,000 tonnes for Spain and 1,500 tonnes for other member states. However, further penalties were introduced if total Community production rose above 1,500,000 tonnes (Table 1.1).

Table 1.1: Revised NGQ and Enforced Penalties, 2001 - 2005

	NGQ '000 tonnes	1st Penalty	Second NGQ '000 tonnes	2nd Penalty
Greece	782	Guide price reduction of 50% of the % rate of overshoot	1,138	Additional 2% penalty on the guide price reduction for each 15,170 tonnes above the second NGQ
Spain	249	Guide price reduction of 50% of the % rate of overshoot	362	Additional 2% penalty on the guide price reduction for each 4,830 tonnes above the second NGQ

Source: DG Agri.

The level of aid to the sector was still required to be at least €770 million and, in the case of high international prices when the level of aid per tonne was lower, the reductions in fixed prices were moderated to ensure the minimum level of expenditure.

2. The means for calculating the market price for unginned cotton was set out in a formula. The price was recalculated three times each month.

3. The rules for advance payment were revised so that an advance could be made, subject to the necessary securities being in place, when unginned cotton entered the ginners' "supervised storage" system. The advance could then be made for the full value of the aid.

4. Under the revised scheme, for the first time, member states were required to consider environmental issues in the granting of the aid. The member states were required to:

- Determine measures to improve the environment, paying particular attention to cultivation techniques; and
- Develop research programmes into more environmentally friendly grower measures and inform growers of the results of such research.

In addition, member states could restrict the areas eligible for production aid on the basis of objective criteria relating to:

- The agricultural economy where cotton was the major crop;
- The soil and climatic conditions in the region concerned;
- The management of irrigation water and rotation systems and cultivation methods likely to improve the environment.

In Spain, this meant that from 2002/03 a system of compulsory crop rotation was introduced at farm level, while in Greece a national decree limiting the production area eligible for aid was introduced. This eligible area was set at 393,700 hectares (a 5% reduction on the average area in previous years).

THE BASIC PRINCIPLES OF THE NEW REGIME

In 2003, the Mid-Term review of the Agenda 2000 Reforms, provided a far-reaching general reform of the CAP. The guiding principle was a move away from price and production support for specific crops to one of direct support for farmers' incomes. Regulation No 1782/2003 implemented the CAP reform and, from October 2003, subject to transition arrangements that were determined by individual Member States, most aid to farmers under the CAP became 'decoupled': that is, farmers receive a single farm payment not linked to the production of a specific crop.

To bring the support schemes for cotton, olive oil, tobacco and hops into line with those of other sectors of the Common Agricultural Policy, the Council adopted Regulation 864/2004. For these crops however, a proportion of the aid remained coupled[6] (i.e., linked to production of the crop). For cotton, the justification for this coupled payment was that the adoption of a completely integrated single farm payment scheme would bring significant risk of production disruption to cotton producing regions. Consequently the decoupled single area payment was set at 65% of the national share of aid available to producers and the remaining 35% remained coupled to cotton but calculated on the basis of a per hectare payment. Regulation 864/2004 inserted in Title IV of Regulation 1782/2003 a special Chapter 10a: "Crop specific payment for Cotton".

Decoupled Aid

The decoupled aid is paid to producers irrespective of their planting decisions. The number of hectares for which the payment is made is dependent on the level of production during the reference period 2001 to 2003.

The amount of decoupled aid differed by member state, and was set at:

- Greece: €966 per hectare
- Spain: €1,509 per hectare
- Portugal: €1,202 per hectare

Coupled Aid

The coupled aid is payable on the opening of the bolls, rather than on harvest and all payments are made directly to the farmers and not, as before, via the ginners.

Under Regulation 864/2004, for environmental reasons, base areas were established in order to limit the areas under cotton. These base areas determined the coupled aid, and were set at 370,000 hectares for Greece, 70,000 hectares for Spain and 360 hectares for Portugal.

[6] In the case of hops, the decision to allow coupled aid was at the discretion of the individual Member State

The amount of coupled aid per eligible hectare was set at:

- Greece: €594.0 per hectare for 300,000 hectares and €342.8 per hectare for the remaining 70,000 hectares
- Spain: €1,039 per hectare
- Portugal: €556 per hectare

Under Article 69 of Regulation 1782/2003, a country could deduct up to 10% of the decoupled area payment and redistribute it as a coupled payment subject to specific quality norms. This option was selected by the Spain government. The decoupled payment in Spain was reduced to €1,358 per hectare and a supplementary payment of €191 per hectare was made if the cotton area contained cotton fibre with maximum impurity of 5%, maximum humidity of 12% and yield higher than a local minimum.

The split between coupled and decoupled payments is shown in Table 1.2.

Table 1.2: Cotton Area Payments (€/hectare)

	Base Area ha	Decoupled Payment 65%	Coupled Payment 35%
Greece [1]	370,000	966	594 - 342.85
Spain	70,000	1,358[2]	1,039
Portugal	360	1,202	556

Note: 1. For Greece €594 per hectare is payable on 300,000 hectares and €342.85 on 70,000 hectares. The calculation for determining the level of payment when the planted area is above 370,000 hectares is [(300.000 ha multiplied by 594) + (70.000 ha multiplied by 342.85)] divided by actual planted area. When the area is less than 370,000 hectares, the calculation for determining the level of payment is [(300.000 ha multiplied by 594) + (additional area ha multiplied by 342.85)] divided by actual planted area.

2. The decoupled payment for Spain is reduced from the agreed level, since 10% of the decoupled payment was replaced by a coupled payment.

Source: DG Agri.

Inter-branch Organisations

The reform also provided funds (€4 million of payments) to create inter-branch organisations. These organisations were to be established between growers and at least one ginner with a view to improving the quality of cotton delivered to the ginner. The inter-branch organisations could establish rules on certain aspects of the contracts between ginners and growers and have the power to differentiate the level of crop-specific aid for their members according to the quality of cotton produced.

The Legal Challenge to the Regime

The reform of the Regime was challenged by the Spanish government, at the European Court of Justice, on four grounds:

- Infringement of Protocol 4;
- Infringement of essential procedural requirements due to a lack of/or inadequacy of reasoning;

- Misuse of powers; and
- Breach of fundamental principles, specifically the principles of proportionality and legitimate expectations.

Infringement of Protocol 4

The Spanish government argued that, because aid was paid on boll opening and not on the harvest of the cotton, it was an infringement of Protocol 4 which required that aid was made to "cotton production". The Court found against Spain in this matter.

Infringement of Essential Procedural Requirements

Here the Spanish government argued that the Council had not adequately explained why the new system abandoned indirect payments of aid via the ginners in favour of direct payments to the producers, nor was the selection of the boll opening stage as the trigger for payment adequately explained. The Court found against Spain in this matter.

Misuse of Powers

The Spanish government argued that the regulation establishing the new cotton support regime was a misuse of power as it was adopted on the basis of paragraph 6 of Protocol 4, but for a different purpose than that for which the paragraph was intended. Again, the Court found against Spain in this matter.

Breach of Fundamental Principles

With regard to legitimate expectations, the Spanish government argued that economic operators in the sector were justified in expecting to continue benefiting from a Community aid system that would not harm the continuance of the crop. The adoption of the contested provisions was, however, unpredictable and was not justified either from a socio-economic point of view or on the basis of the European Union's international commitments. The Court found against Spain in this matter.

With regard to a breach of the principle of proportionality, the Court found in Spain's favour on two grounds:

- The EC failed to carry out an impact study; and
- The EC failed to include direct labour costs in the calculations. The Spanish government's contention under this point was that, in calculating the viability of cotton production, on the revenue side only the coupled portion of the aid should be considered and, in the calculation of production costs, direct labour costs should be included.

In the light of this ruling, the Court annulled Chapter 10a of Title IV of Regulation 1782/2003 which established the new cotton regime. However, the system was allowed to continue to operate until a new regulation was drawn up.

BUDGET EXPENDITURE

Under the old regime, expenditure on cotton aid had a floor of €770 million, and during periods when this level of expenditure would not otherwise have been reached, a higher price was paid to growers. This occurred in 1996, 1998 and 2001. Expenditure peaked at €952 million during 2005 (Table 1.3). Between 2001 and 2005, the annual average amount paid to growers was €761 million, while the administrative fee paid to the ginners averaged €78.3 million.

Table 1.3: European Commission Expenditure on Cotton Aid (€ million)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Greece											
Advance/Balances for previous years	-4.5	0.2	-0.3	-0.3	-11.6	1.0	-0.1	0.5	2.9	0.0	0.0
Advances		575.8	4.2	23.6	12.3	17.3	1.0	1.7	0.0	2.1	0.0
Balances	744.2	88.9	601.7	556.9	678.5	622.3	542.1	567.5	653.5	637.8	726.2
Total	**739.7**	**664.9**	**605.6**	**580.3**	**679.2**	**640.6**	**543.0**	**569.7**	**656.4**	**639.9**	**726.2**
Spain											
Advance/Balances for previous years	0.0	0.0	0.0	0.0	0.4	0.0	-0.1	0.0	0.2	0.0	0.0
Advances		44.5	189.7	108.8	195.2	196.7	157.0	215.5	201.5	163.7	211.4
Balances	57.6	30.6	4.7	71.9	28.3	17.3	33.5	18.8	14.5	31.6	14.4
Total	**57.6**	**75.1**	**194.4**	**180.7**	**224.0**	**214.1**	**190.4**	**234.4**	**216.2**	**195.3**	**225.8**
Total	**797.2**	**740.0**	**800.0**	**761.0**	**903.2**	**854.7**	**733.4**	**804.0**	**872.6**	**835.2**	**952.0**

Source: DG Agri.

Under the reformed regime, the total aid targeted at cotton growers was set at €803 million, based on the average budget spent on production aid over the reference period (2001 to 2003). Initially the Commission proposed that, of this budget, €103 million would be spent on rural development programmes, €418 million on decoupled aid and €278 million on coupled aid.

The basis for this split was that the average aid to the growers (decoupled plus coupled) should equal the average aid actually paid during the reference period less the amount paid to the ginners (i.e., the difference between the guide price and the minimum price) less a balancing adjustment for the difference between the average world price on which the aid applications were fixed and the average actual world price over the same period. However, the final Council decision increased the proportion of decoupled aid at the expense of the rural development funds.

The final budget was allocated in the following manner: rural development €22 million, decoupled aid €502 million and coupled aid €275 million. The balance of €4 million was to be used to assist the creation of Inter-branch Organisations.

Chapter 2: Methodology

THE ECONOMICS OF COTTON PRODUCTION

There are two possible methodological approaches that could be used to analyse the EU cotton regime; an econometric approach or one based on an analysis of gross margins. Our approach is based on the latter. In this chapter, we review both approaches before outlining our methodology in greater detail.

The Econometric Approach

In principle it would be desirable to develop an econometric model to analyse the changes in area and production brought about by the reform to the cotton regime and simulate the impact of alternative policy reforms. However, there are a number of difficulties in following the econometric approach, in particular:

- All but one of the observations that would be used in the model are historical and based on the outcomes of the old regime. These observations reveal farmers' reactions to relatively small changes in gross margins and grower prices. It is unclear whether such a model based on these relatively small differences in price and margins would capture adequately the reactions to the large changes that have occurred with the new regime and the transformation in the method of payment of aid from a production to area based system.

- We only have one year's observations of reactions to the change in regime, and even here we only have partial data. This lack of data makes rigour in the quantitative analysis impossible.

- There are difficulties in modelling the change in regime from one based on a payment per tonne of cotton to one based on a per hectare payment. Past studies have translated the per hectare payment into a payment per tonne. This, however, implicitly assumes that producers view a decoupled payment as linked in some manner to continued cotton production, which would be inconsistent with profit maximising behaviour, equating marginal revenues and costs from cotton.

- The calculation of elasticities. These vary considerably across studies, which can lead to a wide range of estimates. In addition, it is unclear under the new policy regime which price should be used as the starting point for the application of the supply elasticity; is it the price paid by the gin or, the ginner's price plus the cotton area payment per tonne? The correct choice depends upon producers' perceptions.

Gross and Net Margin Analysis

The limitations of the econometric approach suggest that an alternative approach is required. The alternative, linking data on producers' margins to the intensity of their preferred technology and their planted areas in 2006, is less precise in quantitative terms, but it does allow us to analyse how farmers responded to the change in regime and deduce how they would be likely to response to further change.

The calculation of gross margins permits us to make a quantitative estimate of the way in which reforms in the regime have fed through to production incentives.

In estimating production costs and gross margins, three data sources have been used.

- **FADN data**, which are only available to 2004. The FADN data cover on average 1,050 Greek and 170 Spanish farms per year. We have divided this sample according to the importance of the cotton area to the total farm area. For the calculation of production costs we have used farms that grow 100% cotton. This is because we can attribute all costs to cotton. For farmers who grow cotton and other crops, it is more difficult to interpret FADN data, since there is no guide to cost allocation between crops. Another difficulty in analysing FADN data is that the farmers in the sample can change each year. The use of cohorts allows the same farmers to be analysed each year, providing more consistent estimates.

- In Greece, the cohort is large; 397 farms were sampled in all five years, while 525 were sampled in at least four years. However, in Spain, the number of farmers whose results can be analysed over the full five years is only 8, while 57 farms appear in at least four years. This means that the sample changes considerably between years. For instance, the sample of farms with 100% cotton more than doubled from 2002 to 2003. Therefore, changes in the available data may reflect a change in sample rather than in farm practices; hence the FADN data need to be cross-checked against other available data.

- As FADN data are only available until 2004, to provide an understanding of the effect of the reforms in 2006, we have used face-to-face **questionnaires** for a sample of 200 growers in Greece and 57 growers in Spain. Respondents covered the main producing areas and the major farm sizes. These questionnaires have been used to provide both qualitative and quantitative data on the changes that have occurred in farming practices since the beginning of the reform; and

- **A private independent Spanish database** (referred to as “Private Database” throughout). The company surveys a number of Spanish farmers each year and 15 farms in the sample grow cotton. They farm on average 130 hectares and of this area around 25% is under cotton. Although the sample is small, a set of consistent estimates can be developed because the same farms are sampled each year,. Data for some of the farms are also available for 2006, although the Private Database sample is not complete. The use of this database enables us to cross check some of the results of the questionnaire survey and for FADN data for earlier years. The database is valuable, too, in providing costs not just for cotton but also for the alternative crops that are grown on each particular farm.

Through the use of the questionnaire, one can observe how gross margins, yields and production technology changed during 2006. Relating the changes in gross margins computed for cotton and alternative crops to information on the variations in the areas under cotton, one can simulate the expected outcomes to alternative policy proposals regarding the Cotton Regime.

Using a questionnaire was valuable in obtaining results from a good cross section of producers to gauge both production costs (from to determine gross margins) and an understanding of their reactions to major reforms in the regime. The questionnaire also elicits information about their likely response to future policy reforms.

Interviews and questionnaires in selected regions also allow us to obtain a wider range of information, both qualitative and quantitative, than alternative approaches about the behaviour and perceptions of participants in the cotton sector regarding the changes introduced to the Cotton Regime during the period under review.

To determine the price at which growers dedicate land and/or capital to cotton production, it is necessary to analyse the costs of growing cotton. However, cotton production costs provide only the first, albeit very important, step in determining the cotton prices necessary for growers to continue to produce cotton. Subject to rotational and other agronomic constraints, growers typically choose to grow the most profitable crop available in the region. This means that, where growers have genuine alternatives to cotton (and this is true in all the featured regions), it is necessary to look beyond the costs of growing cotton and to assess also the costs and profitability of alternative crops, so as to determine the opportunity cost of land to producers.

This approach is adopted because growers will need to receive a cotton price that covers the costs of producing cotton and compensates them for the profit that they would have earned had they grown the next best alternative crop. The profit-equalising cotton price indicates this particular threshold level of the cotton price.

This analysis may be adapted to take account of the way in which the choice of field production technology, in terms of the use of inputs, has adapted over time to factors such as changes in the revenues obtained from sales of the alternative crops. Where policy measures affect the marginal revenue of a cotton producer, notably by lowering producer prices, producers adapt their choice of inputs and adjust their production costs to reflect the new prices.

Micro-economic analysis of individual farm operations and of the impact of policy measures upon the profitability of different categories of producers (by size, degree of specialisation, location, etc.) provides a valuable means of understanding farmers' behaviour. By constructing a range of production cost models for different typologies of farmers and preparing cost estimates for the main alternative crops that are open to them, one can simulate the impact of changes in specific policy measures or changes in a wide variety of economic variables upon the enterprises' choice of crop over time.

Modelling the Reform

With the benefit of only one year's incomplete data since the reform of the regime, we have a limited empirical basis from which to analyse the initial reactions of farmers to the change and draw some conclusions as to the likely impact of a continuation of the regime as opposed to possible changes.

The decisions that will be taken by the farmer can be modelled by examining the gross margins that are available under each scenario. This is first calculated on a per hectare basis, but can also be calculated in terms of a return to labour (whether unpaid, paid or both combined). In terms of gross margins, the following observations are apparent:

- Whatever the farmer chooses to do with former cotton land, the 65% decoupled payment is made. In terms of revenues from a particular crop and production choices, the decoupled payment is neutral between all of the options. The choice of inputs is also unaffected by changes that occur solely in direct payments over time, as long as the producer prices received by the farmer are unaltered.

- The decision to plant cotton will be depend, in part, upon the gross margin that can be achieved from the sale of cotton and from the coupled payment on cotton crops compared to the returns on alternative crops. As the size of this payment is altered, so the gross margin of cotton changes vis-à-vis other crops.

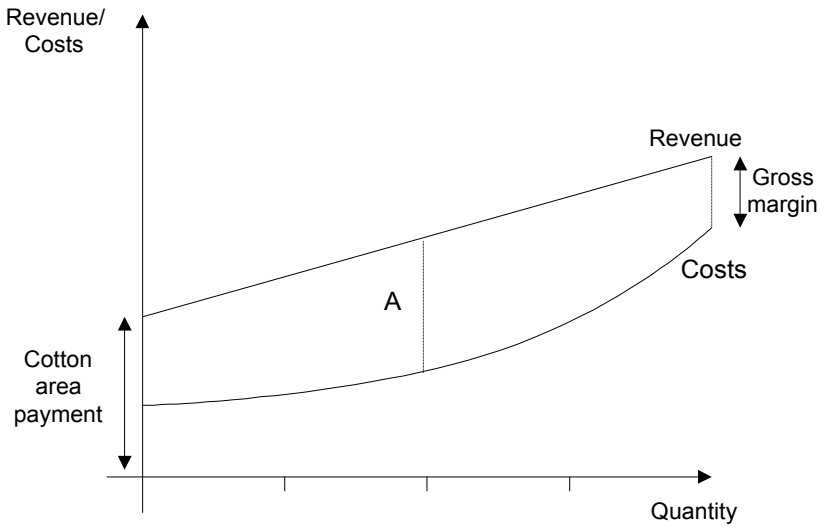
- The decision to maintain production at historical yields will depend upon the gross margins that can be achieved compared to those offered under the

reformed system. At one extreme, cotton could be just planted with a view to meeting the conditions required for the receipt of the coupled payment. In this case, the cotton will only be harvested if the harvesting costs are covered by the price that is being offered by the ginner. Unit harvesting costs per tonne of cotton will be high if yields are low.

- A different outcome may occur when other forms of incentive are offered to farmers. For example, in the case of integrated production systems, a further payment may be made, subject to the production technology being considered "sustainable". This often means a change in the production system away from an intensive system to a more extensive production system that is compatible with certain environmental norms.

Diagram 2.1 depicts these relationships in stylistic terms. The farmer will maximise the gross margin at the point where the gap between the revenue line and the cost curve is the greatest, point **A** on the diagram.

Diagram 2.1: Relationship between Cotton Revenues and Costs



Modelling the Impact of Changes to the Cotton Regime

To analyse the impact of changes to the regime, three scenarios are considered:

- The deficiency payment system, which applied until the 2005 crop;
- The 2004 reform scenario, including the effect of varying the share of decoupling; and
- Full decoupling.

Whereas FADN data and available production cost studies provide a basis for determining historical costs, the questionnaires may be used to derive current costs and gross margins for a range of technologies, from the highly intensive systems that were in operation prior to the reforms to a less intensive system, as was found in Spain in 2006. These costs are estimated by asking farmers how their input use altered from 2005 to 2006, with the responses assessed separately for farms of different sizes and

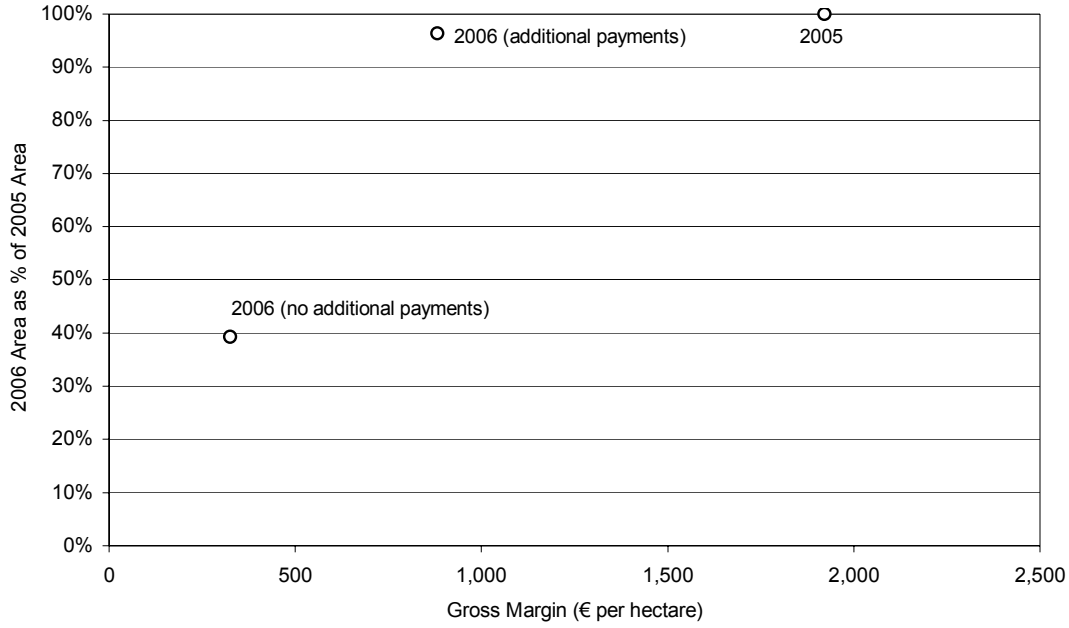
in different regions. With this information, one may compute the changes to gross margins that would follow changes in the policy regime. These new gross margins for cotton may then be compared to gross margins for alternative crops. This provides a indication for the relative profitability of cotton vis-à-vis alternative crops.

The **Deficiency Payment System** refers to a system where aid is paid per tonne of unginned cotton. This is the same as the measures in effect prior to the recent reform. To analyse the outcome of this system, we examine the gross margins that existed prior to the reform for cotton with those of the main competing crops.

The **2004 reform scenario** covers the existing system. To calculate the effect of altering coupled and decoupled payments, we use responses gleaned from the questionnaire. By asking farmers “what if” questions regarding policy changes, we gain an impression of how farmers would respond to such changes. For instance, asking "How would you change your area under cotton to, say, a 10% reduction in cotton area payment?" "To a 20% price reduction?" etc, allows us to develop a series of "pseudo-elasticities", which give us a guide as to the strength of responses to particular policy changes. This is an approach that was used to gauge the modal response to policy changes in the Evaluation of the Common Market Organisation for the Cereal Sector.

For growers who planted cotton in 2006, we can derive a base area for 2005 from their questionnaire responses on their areas changes from 2005 to 2006. If we set this base level at 100% for different group of farms in 2005, we can plot how the change in the gross margin affected the planting decision for each group in 2006. This is illustrated for Spain in Diagram 2.2, where two types of producer are identified: (i) those receiving additional payments on top of the decoupled payment, i.e., an agro-environmental payment, and (ii) those that do not. Once a logistic curve is fitted to the observations, we can estimate how plantings would react to a given change in the coupled payment.

Diagram 2.2: Change in Area and in the Gross Margin, 2006 versus 2005



A **fully decoupled** system is one with no coupled payments. Gross margins can be calculated and compared with other systems. In this case, coupled payments for competing crops, where they continue to exist, i.e., Spain, are also set to zero.

By drawing extensively upon producers' individual experiences in 2006, it is very likely that this methodology, relating changes in relative gross margins to crop choices, will provide more robust results than those derived from an econometric model. This is due to the magnitude of the change in policy since 2005 and the sharp difference in the per tonne payment to growers.

THE ECONOMICS OF GINNING

In order to understand the implications of the reforms on the ginning industry, we follow a similar approach.

First, it is necessary to determine the level of production under each of the three scenarios outlined above. This draws upon estimates of the changes in area and yields, following the methodology described above, based upon questionnaire returns.

Second, capacity utilisation is an important determinant of costs and we seek to determine the impact of changes in production on capacity utilisation. As gins work for different numbers of days, we need an objective benchmark for rated annual capacity from which to estimate utilisation. (Traditionally in Spain the ginning season has been around 60 days compared to around 80 days in Greece) Our assessment of capacity is based on US averages of the length of the ginning season. The US average is a 81 day ginning season, in which gins operate for 17.5 hours per day, and this is used as the reference.

Data collection and analysis follow the same principles as those used for farmers. We have used four sources of data:

- **Questionnaires:** Interviews have been conducted with a sample of ginners in Greece and Spain. In Greece the sample covered 50% of the industry while in Spain the sample covered 25% of the industry. The sample covered private and cooperatively owned gins, as well as gins with single and multiple operations. The questionnaires covered issues ranging from capacity, employment, cotton quality and production costs.

- **Use of statistical databases:** In the case of Greece, it was possible to obtain a database that provided with individual company annual accounts. The database from ICAP International covered 33 ginning companies and provided accounts to the end of the 2005/06 financial year. This provides us with an independent cross-check on the results of the questionnaire.

- **Comparative detailed data from the US ginning industry.** LMC's office in Lubbock, Texas, the heart of the US cotton ginning industry interviewed US ginners and collected detailed engineering cost data on US ginneries with different scales of capacity. A visit was then made to Europe to verify the European data and provide a comparison between the two industries.

- **Official data from governments and industry associations.** These data were particularly useful in providing information on capacity levels.

CAVEATS

There are two important caveats to the analysis:

- As the reform was introduced in 2006, we only have one year's data on which to base our analysis. The full effect of the reforms on production and the planted area is likely to take longer to work though. This is particularly the case in Greece where there is a degree of inertia among Greek producers, due in part to the small scale of the production units. However, one year's worth of data and the responses to the questionnaire (particularly the questions concerning the response to a change in regime) provide a valuable insight into the state of the industry.

- The speed with which farmers switch between crops depends upon the gross margin, which is a function of both prices and costs. Our analysis in based on the prices that faced producers on planting in 2006. Over time, prices change. For instance, a rise in cereal prices relative to cotton (such as occurred between the time when planting decisions were being made for the 2006 and 2007 crops) would push gross margins further in favour of cereal production over cotton. This would then have an impact on the relative size of the cotton and cereal area. We evaluate the impact of changing prices by using sensitivity analysis and see how gross margins change if we assume that the FAPRI long term price projections hold.

Chapter 3: The EU Cotton Sector

Chapter 3 is in two sections: Section 1 presents EU-wide data on the cotton sector; while Section 2 examines the economics of cotton production before and after the Cotton Reform introduced in 2006.

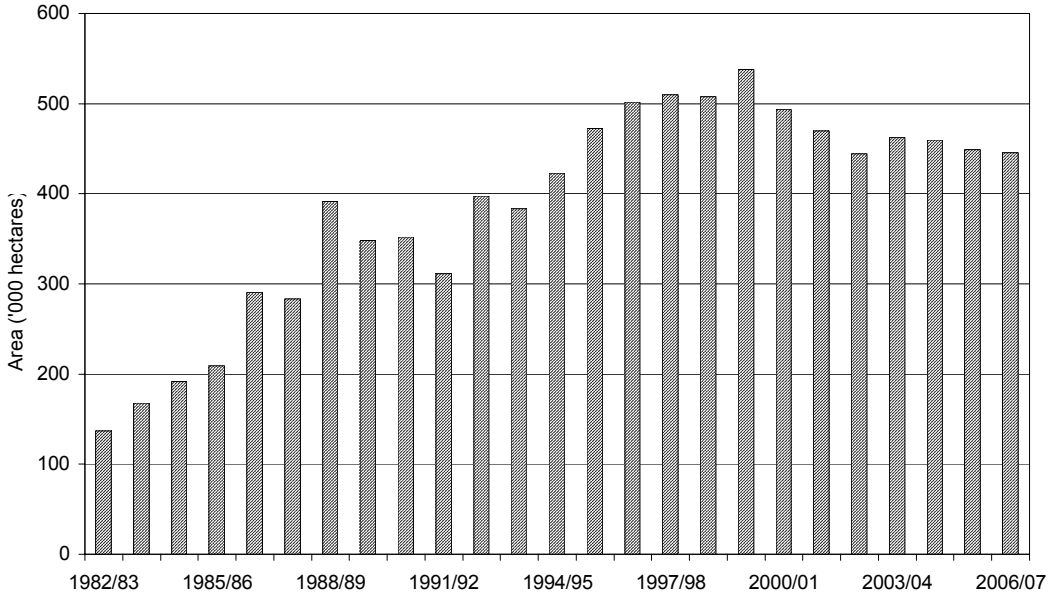
OVERVIEW OF COTTON PRODUCTION

Total Cotton Area and Production

Cotton is produced in four EU-27 states, namely Greece, Spain, Portugal[1] and Bulgaria. Production is dominated by Greece and Spain. Production in Portugal and Bulgaria was just 1,285 tonnes and 611 tonnes in 2005, respectively. Production ceased in Portugal in 2006 following the reform of the cotton regime. In the following sections, we focus on trends in Spain and Greece, the largest producers.

The EU-15 cotton area grew steadily until the end of the 1990s, peaking at almost 540,000 hectares in 1999/2000. Since then the area under cotton has stabilised at 450,000 hectares (Diagram 3.1).

Diagram 3.1: EU Cotton Area



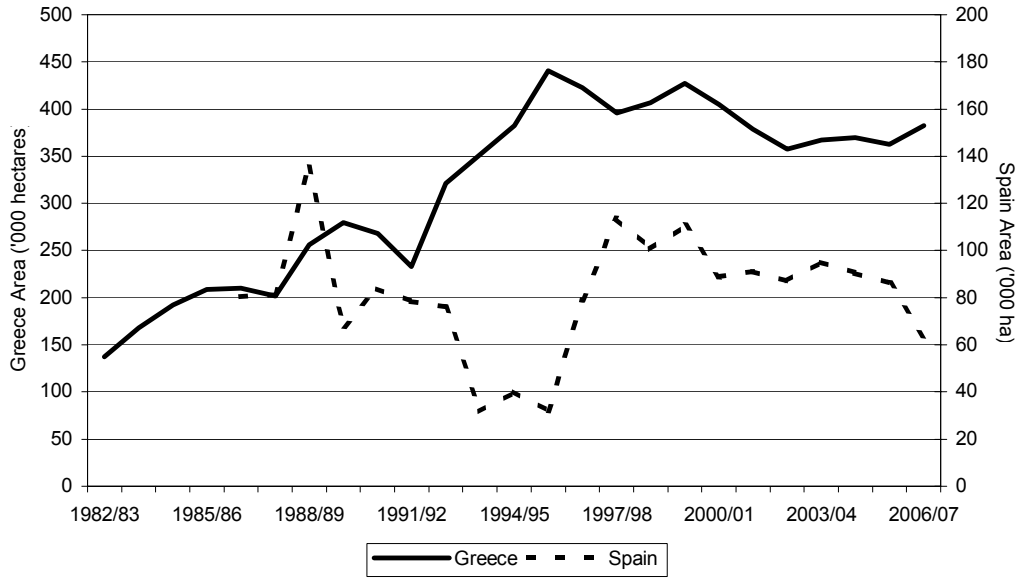
Note: Spanish data are only included from 1986/87 with its accession to the EU.
Source: DG Agri, National Authorities

In Greece the cotton area peaked in 1995/96 at 441,000 hectares. The area then fell to approximately 360,000 hectares, but rose to 383,000 hectares in 2006/07. In Spain, the picture has been more erratic: the area peaked in 1988 at 135,000 hectares and then

[1] With only small volumes produced in Portugal, unginned cotton was transported to Spain for ginning.

declined dramatically in 1993/94 through to 1995/96 owing to drought. The area under cotton then revived, peaking at 114,000 hectares in 1997/98. The area under cotton fell to 63,000 hectares in 2006/07 (Diagram 3.2).

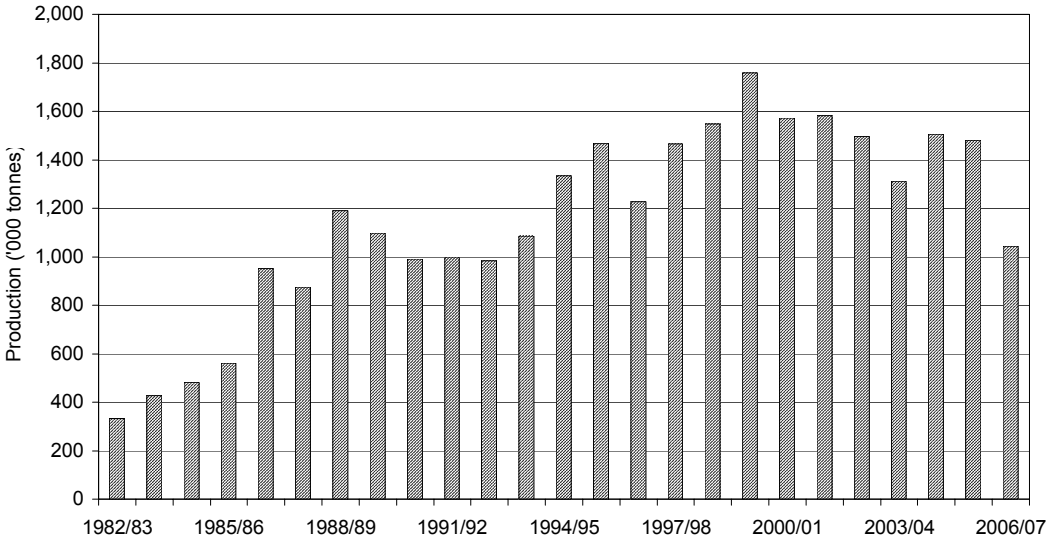
Diagram 3.2: EU-15 Harvested Cotton Area by Country



Note: Data for Spain cover only the period since accession to the EU.

With a growing area and rising yields, EU cotton production peaked in 1999/2000 at 1.8 million tonnes of unginned cotton. In 2006/07, total output fell to its lowest level since the 1980s. This was due to a combination of impact of regime change (in Spain) and poor weather in Greece (Diagram 3.3).

Diagram 3.3: EU-15 Unginned Cotton Production



Note: Data for Spain cover only the period since accession to the EU.

The Cotton Sector of Greece

Greek production is dominated by four NUTS2 regions (Central Macedonia, East Macedonia, Thessalia and Sterea Ellada). These areas account for 96% of the total cotton area (Table 3.1).

Table 3.1: Greek Cotton Area by NUTS 2 Region (hectares)

	2004/05	2005/06
Anatoliki Makedonia	54,660	53,570
Kentriki Makedonia	96,972	95,053
Dytiki Makedonia	0	1
Thessalia	150,749	147,612
Ipeiros	466	455
Dytiki Ellada	8,084	7,604
Sterea Ellada	53,977	53,136
Peloponnisos	1	1
Attiki	711	684
	365,622	**358,116**

Source: Ministry of Agriculture.

Cotton accounts for 9.1% of final Greek agricultural output. A breakdown of the importance of production by region is not available.

There are 79,700 farmers involved in cotton farming in Greece; these are concentrated in Anatoliki Makedonia, Kentriki Makedonia, Thessalia and Sterea Ellada.

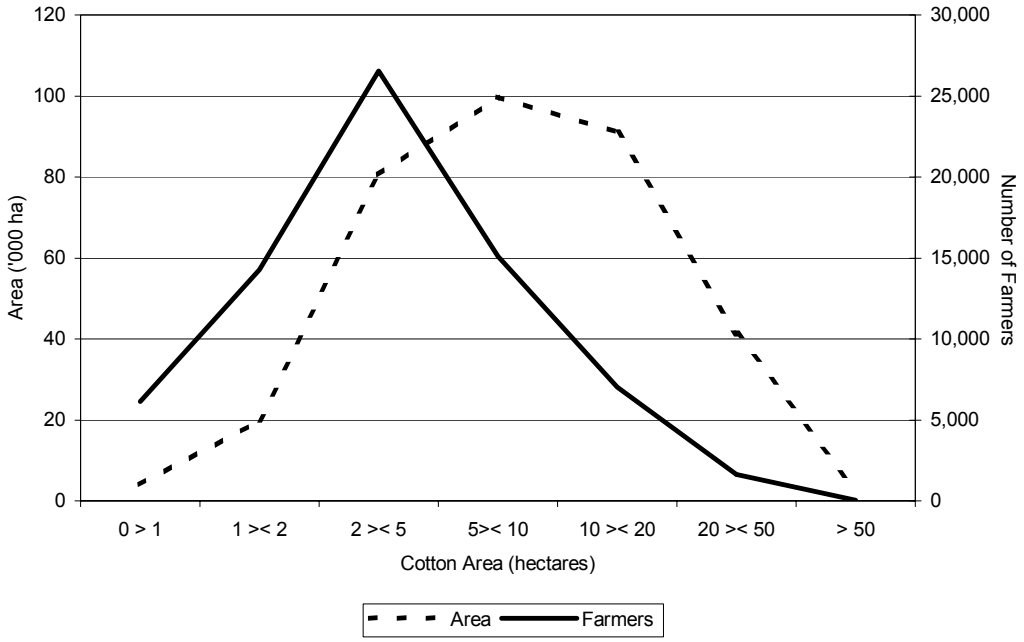
The majority of farmers grow between 2 and 5 hectares of cotton. The average cotton area across all farms was 4.5 hectares in 2005 (Diagram 3.4). FADN data give an indication of the importance of cotton to the total farm area. In 20% of cases in Makedonia, cotton accounted for over 75% of the farm area, while in Thessalia in 36% of cases cotton accounted for over 75% of the total farm area (Table 3.2).

Table 3.2: The Importance of Cotton to Total Farm Area (Number of observations)

Area under cotton (%)	1998	1999	2000	2001	2002	2003	2004	Average
Makedonia-Thraki								
>25%	207	171	189	182	199	170	186	29%
25%-49%	242	219	216	201	184	196	187	31%
50%-74%	176	159	178	143	114	104	116	21%
75%-99%	82	86	73	69	65	64	62	11%
100%	64	73	54	56	50	54	45	8%
Ipiros-Peloponi/Thessalia/Sterea Ellas								
>25%	37	46	43	43	42	36	36	10%
25%-49%	115	98	105	95	79	93	77	21%
50%-74%	128	116	158	144	134	125	121	33%
75%-99%	159	110	115	108	90	103	92	24%
100%	57	53	50	45	54	49	57	12%

Source: FADN.

Diagram 3.4: Harvested Cotton Area by Farm Size in Greece, 2005



In terms of other crops grown on cotton farms, cereals, particularly durum wheat and maize, dominate. Sugar beet is also important.

Over 99% of Greek cotton production is grown under irrigated conditions (Table 3.3). The most important type is sprinkle (around 40% of total area), followed by drip (a little more than 30%). The rest (around 30%) is gravity. The share of drip irrigation has been growing in recent years. No cotton is grown under plastic.

Table 3.3: Cotton Area in Greece by Irrigation Type ('000 hectares)

	2001	2002	2003	2004	2005
Area ('000 ha)					
Irrigated	389	377	373	361	355
Non-irrigated	15	10	5	4	4
Total	**404**	**388**	**378**	**366**	**358**

Source: Ministry of Agriculture.

The Cotton Sector of Spain

Spanish cotton production is dominated by Andalucia, which accounts for 98% of its national production. Within Andalucia, the cotton area and production are dominated by Sevilla; Cadiz and Cordoba are also important (Table 3.4).

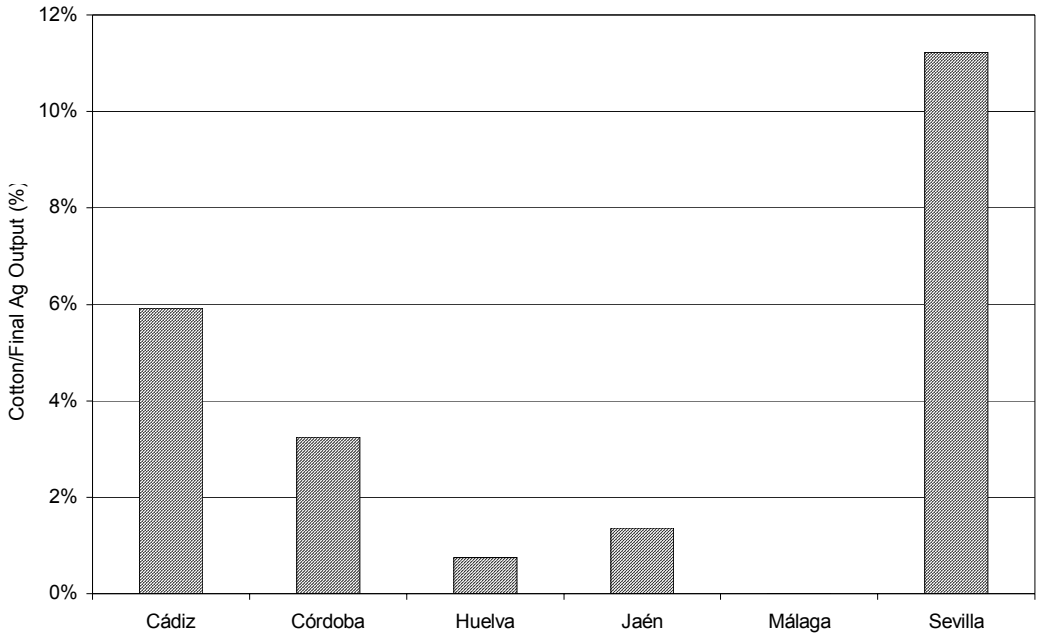
Table 3.4: Spanish Cotton Area by NUTS 3 Region (hectares)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Cádiz	8,910	12,851	13,899	15,102	15,662	16,035	12,596	15,749	13,676	14,514
Córdoba	8,729	14,850	11,207	13,245	9,556	10,110	10,323	11,763	12,582	11,752
Huelva	720	728	846	1,050	944	1,112	1,037	1,225	1,164	1,148
Jaén	7,122	9,100	5,948	6,500	6,711	6,790	6,183	6,999	7,499	6,972
Málaga	210	165	107	80	167	63	47	49	48	33
Sevilla	48,200	70,347	63,600	69,947	56,404	54,896	53,741	56,965	52,850	51,687
Murcia	2,880	3,299	2,873	2,468	2,149	2,471	2,436	1,907	1,691	1,946
Total	**76,771**	**111,340**	**98,480**	**108,392**	**91,593**	**91,477**	**86,363**	**94,657**	**89,510**	**88,052**

Source: Data on the province of Andalucia (Cádiz, Córdoba, Huelva, Jaén, Málaga and Sevilla): Boletín de Información Agraria y Pesquera. Consejería de Agricultura y Pesca. Junta de Andalucía.
Data on the province of Murcia: Spanish Ministry of Agriculture and Fishery (MAPA).

Cotton accounts for 1.3% of final Spanish agricultural output, but it is particularly important in Sevilla (11.2%), Cadiz (5.9%) and Cordoba (3.2%) (Diagram 3.5).

Diagram 3.5: Cotton as % of Total Agricultural Output Value in Andalucia, Spain , 2003 to 2005



There are 9,500 farmers involved in cotton farming in Andalucia; these are concentrated in Sevilla, Cadiz and Cordoba.

The majority of farmers grow less than 10 hectares of cotton, although the inclusion of the cotton area grown on bigger farms brings the average cotton area across all farms to close to 10 hectares (Diagram 3.6). For many of these farms, cotton is just one of the crops grown. On average, cotton accounts for 50% of the farm area on cotton growing holdings in Jaen, 28% in Sevilla and 24% in Cordoba.

Of the total number of farms, 38% grow solely cotton; they account for 25% of the total cotton area. Wheat, maize, sunflower and sugar beet are the other main crops that are also grown by farmers who cultivate cotton (Table 3.5).

Diagram 3.6: Harvested Cotton Area by Farm Size in Spain

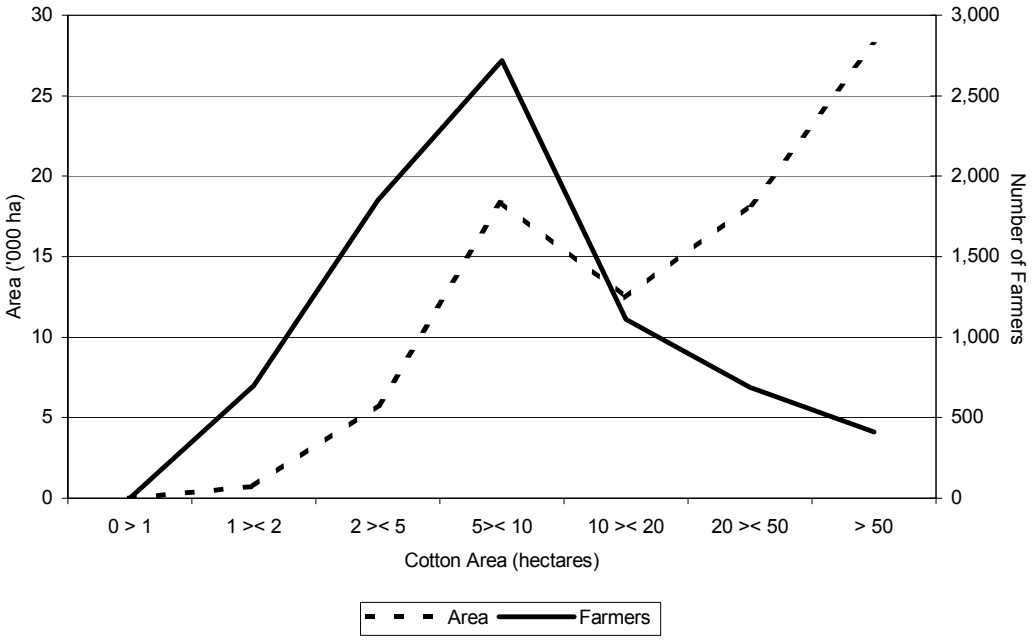


Table 3.5: Crop Specialisation in Andalucia

	2000/01	2001/02	2002/03	2003/04	Average
By Farm					
Only cotton	3,159	3,083	3,027	3,619	3,222
Cotton and tree crops	174	155	247	299	219
Cotton and rainfed wheat and sunflower	1,136	1,214	1,245	1,355	1,238
Cotton and maize	364	1,102	1,359	1,382	1,052
Cotton and irrigated wheat and sunflower	1,316	718	802	794	908
Cotton and vegetables	219	253	296	366	284
Cotton and sugar beet	1,416	1,139	1,236	1,198	1,247
Cotton and other arable crops	311	241	399	405	339
					8,507
By Area (Ha)					
Only cotton	26,095	23,980	16,144	20,784	21,751
Cotton and tree crops	4,071	3,801	4,312	4,248	4,108
Cotton and rainfed wheat and sunflower	14,604	15,895	15,340	16,649	15,622
Cotton and maize	3,482	14,192	16,729	18,065	13,117
Cotton and irrigated wheat and sunflower	20,996	13,881	12,978	12,037	14,973
Cotton and vegetables	3,116	3,066	2,972	3,644	3,200
Cotton and sugar beet	12,416	11,210	11,233	11,396	11,564
Cotton and other arable crops	2,999	2,907	4,711	5,632	4,062

Source: Diagnóstico del sector Algodonero Andaluz. 2005. Consejería de Agricultura y Pesca. Junta de Andalucía

Around 96% of production is grown under irrigated conditions in Andalucia. In Murcia, all the cotton area is irrigated. Gravity irrigation is the most popular system (Table 3.6). Between 2000/01 and 2003/04, 64% of the cotton was grown under plastic. However, in 2006 with the increased use of agri-environmental measures and a move to a less intensive production system, the area under plastic fell to zero.

Table 3.6: Cotton Areas in Andalucia by Irrigation Type (hectares)

	2000/01	2001/02	2002/03	2003/04
Irrig/Rainfed				
Rainfed	3,474	3,937	2,308	3,875
Irrigated	84,276	84,997	82,112	88,581
Type of Water Application				
Rainfed	3,474	3,937	2,308	3,875
Sprinkle	19,084	17,763	15,388	14,957
Drip	21,321	22,114	21,808	26,591
Gravity	43,871	45,120	44,916	47,033
Total	**87,750**	**88,934**	**84,420**	**92,456**

Source: Diagnóstico del sector Algodonero Andaluz, 2005. Consejería de Agricultura y Pesca. Junta de Andalucía.

THE ECONOMICS OF COTTON PRODUCTION

This section examines the economics of cotton production with a view to determining production costs and gross margins for cotton both prior to and following the reform of the regime in 2006. The section also reviews how costs, gross margins and relative profitability have changed for the main competing crops in the light of the reform.

As explained in Chapter 2, the analysis is based on FADN data, a survey of cotton farmers and a private sector database (for Spain). Detail is provided in Appendices 1-3.

Data on production costs are available from FADN until 2004. For 2005 and 2006, we make use of questionnaire responses where farmers were asked how their use of inputs had changed between 2000 and 2005 and between 2005 and 2006. In adapting FADN data for 2004, we assumed that input use changed from 2004 to 2005 at 20% of the total change reported between 2000 and 2005.

In order to determine cotton production costs from FADN data, we analyse the farms that grow only cotton. Analysing the data in this way, we are able to attribute all the costs of the farm operations to cotton. This is very helpful, as the FADN does not differentiate costs between crops on mixed farms. Restricting our focus to 100% cotton farms therefore provides a more accurate assessment of total production costs than one that includes costs of other crops.

For the alternative crops, in order to obtain a sufficiently large sample size from the FADN data and minimise problems in the allocation of overhead costs, we have taken farms with between 75% and 100% of the total revenue derived from their major crop in the cases of durum wheat and maize and over 50% of total revenue for sunflower.

In calculating gross margins, we use three definitions:

- Gross margin (excluding family labour) is calculated as per hectare revenue minus variable costs (excluding family labour);

- Gross margin (including family labour) is calculated as per hectare revenue minus variable costs (including family labour); and
- Return to unpaid labour is calculated as the gross margin (excluding family labour) divided by the number of unpaid labour hours.

Total profit is calculated as:

- Total Profit (excluding family labour) is calculated as per hectare revenue minus total costs (excluding family labour);
- Total Profit (including family labour) is calculated as per hectare revenue minus total costs (including family labour); and
- Return to unpaid labour is calculated as the total profit (excluding family labour) divided by the number of unpaid labour hours.

To simplify our analysis and to ensure there are enough observations in each grouping, we have divided the Greek sample into two regions:

- Makedonia-Thraki
- Ipiros-Peloponis, Thessalia and Sterea Ellas (referred to as Thessalia/Sterea Ellas throughout).

We treat Spain as one grouping

Cotton Production Costs Prior to the Regime Change - Greece

Makedonia-Thraki

According to the FADN data, within the Makedonia/Thraki region, total variable costs (excluding unpaid labour) averaged €1,127 per hectare over the five year period between 2000 and 2004, with fixed costs of €815 per hectare. The costs are relatively stable between years, which increases our confidence in the numbers. Fixed costs are large due to the high reported levels of depreciation.

The number of unpaid labour hours amounted to 224. Assuming that the opportunity cost of this labour is the paid wage, total costs averaged €2,519 per hectare (Table 3.7 and Diagram 3.7). Production costs are highest on the smallest farms (Table 3.8).

Ipiros-Peloponis, Thessalia and Sterea Ellas

Within the Thessalia/Sterea Ellas region, total variable costs (excluding unpaid labour) averaged €1,015 per hectare over the five year period, with fixed costs of €676 per hectare.

The number of unpaid labour hours amounted 230. Assuming that the opportunity cost of this labour is the paid wage, total costs averaged €2,306 per hectare. From the FADN data costs appear to be highest on the largest farms (Tables 3.9 to 3.10 and Diagram 3.8).

Table 3.7: Average Production Costs for 100% Cotton Farms, Makedonia-Thraki
(€/hectare)

	2000	2001	2002	2003	2004	2005 (e)
Variable Costs						
Seed	131	135	106	118	122	122
Fertiliser	168	164	149	144	154	154
Crop Protection	197	196	180	208	212	212
Other Specific Costs	24	19	28	33	29	30
Energy and Fuel	178	183	171	177	183	189
Contracted labour/services	294	272	274	263	263	263
Water/irrigation	96	107	108	103	108	108
Other Direct costs	13	14	9	12	13	13
Labour (paid)	39	43	48	63	83	83
Total Variable costs	1,138	1,132	1,074	1,120	1,169	1,169
Fixed Costs						
Machinery	52	55	48	51	56	56
Depreciation	443	469	538	517	572	572
Rent	192	216	276	281	274	274
Interest	11	8	11	11	12	12
Total Fixed Costs	698	748	873	860	914	914
Total Costs	1,836	1,881	1,947	1,980	2,082	2,082
Total Unpaid labour (hrs)	244	230	239	209	195	195
Average hourly wage	2.2	2.4	2.6	2.7	3.0	3.2
Total unpaid labour	544	551	612	569	593	614
Total cost including unpaid labour	.					
Variable Cost	1,627	1,628	1,624	1,632	1,702	1,721
Fixed Cost	753	803	934	917	973	975
Total Cost	2,380	2,432	2,559	2,549	2,675	2,697

Note:
1. To derive costs including family labour we have valued family labour at the paid labour rate
2. In deriving total costs it is assumed that 90% of unpaid labour is attributed to variable costs and 10% to fixed costs.
3. 2005 data are based on questionnaire data where farmers were asked how their use of inputs had changed

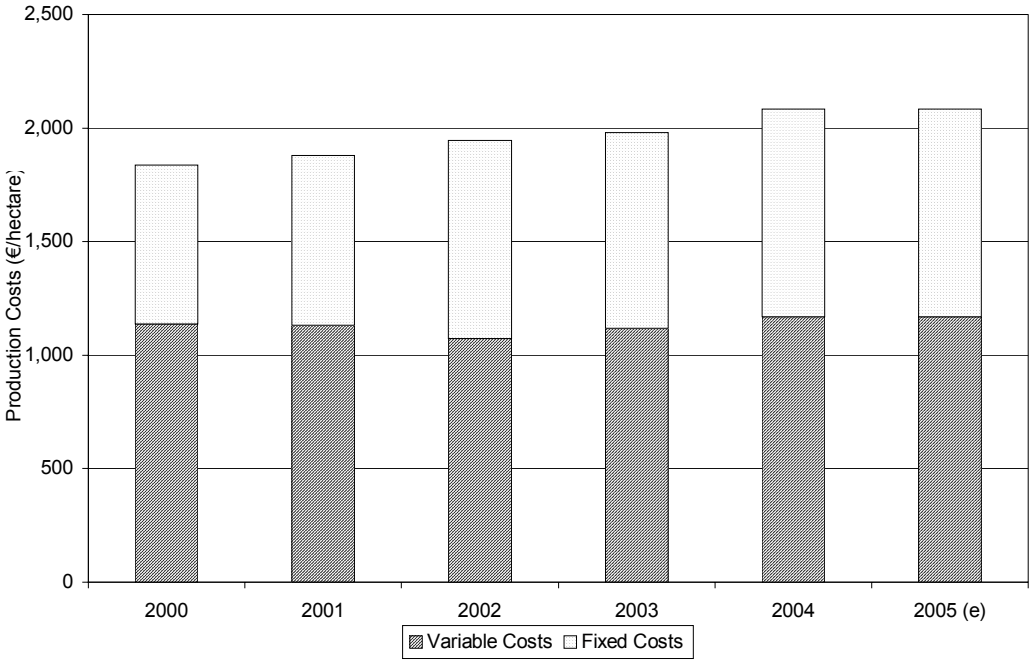
Sources: FADN, LMC.

Table 3.8: Cotton Production Costs by Farm Size, Average 2000 to 2004, Makedonia-Thraki (€/hectare)

	> 5 ha	5 - 10 ha	10 -20 ha	20+
Costs excluding Family Labour				
Variable	1,197	1,092	1,101	961
Fixed	906	823	738	650
Total	2,103	1,915	1,839	1,611
Costs including Family Labour				
Variable	1,862	1,585	1,435	1,304
Fixed	980	878	775	688
Total	2,842	2,463	2,210	1,992

Source: LMC based on FADN data for 100% Cotton Farms.

Diagram 3.7: Cotton Production Costs, Makedonia-Thraki



Source: FADN.

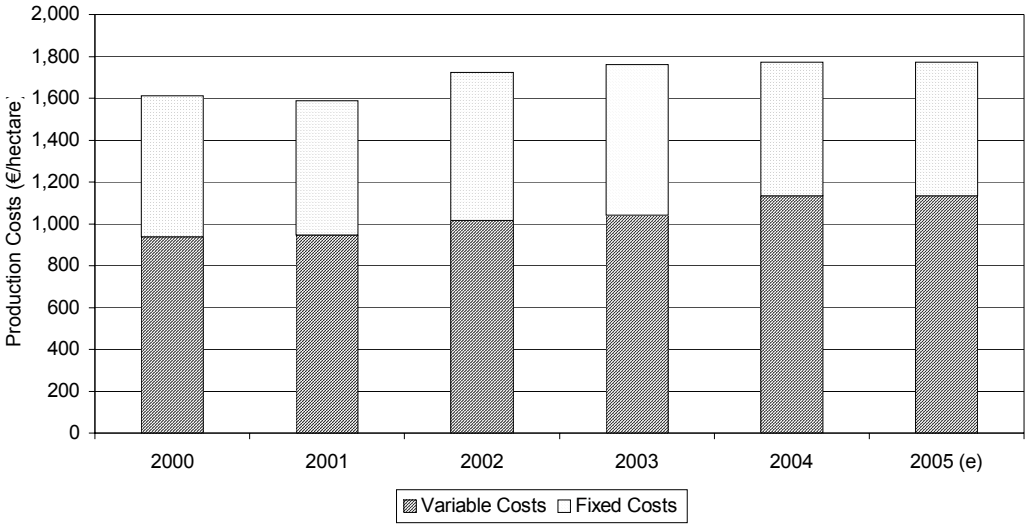
Table 3.9: Average Production Costs for 100% Cotton Farms Thessalia/Sterea Ellas (€/ha)

	2000	2001	2002	2003	2004	2005 (e)
Variable Costs						
Seed	142	153	155	163	202	202
Fertiliser	144	146	160	149	164	164
Crop Protection	91	89	107	116	133	133
Other Specific Costs	20	17	17	9	12	12
Energy and Fuel	199	197	223	250	280	290
Contracted labour/services	270	283	265	244	247	247
Water/irrigation	26	24	39	42	48	48
Other Direct costs	13	12	20	34	18	18
Labour (paid)	31	24	30	36	30	30
Total Variable costs	937	945	1,016	1,042	1,134	1,134
Fixed Costs						
Machinery	39	45	46	44	38	38
Depreciation	370	349	389	384	339	339
Rent	206	230	254	275	254	254
Interest	58	19	18	16	8	8
Total Fixed Costs	673	642	707	719	639	639
Total Costs	1,610	1,587	1,723	1,761	1,773	1,773
Total Unpaid labour (hrs)	231	240	248	210	220	220
Average hourly wage	2.2	2.4	2.6	3.0	3.1	3.2
Total unpaid labour	517	582	657	640	683	707
Total cost including unpaid labour						
Variable Cost	1,402	1,469	1,607	1,618	1,748	1,770
Fixed Cost	725	700	773	783	707	709
Total Cost	2,127	2,169	2,380	2,401	2,455	2,479

Note: 1. To derive costs including family labour we have valued family labour at the paid labour rate
2. In deriving total costs it is assumed that 90% of unpaid labour is attributed to variable costs and 10% to fixed costs.

Sources: FADN, LMC.

Diagram 3.8: Cotton Production Costs, Thessalia/Sterea Ellas



Source: FADN

Table 3.10 Cotton Production Costs by Farm Size, Average 2000 to 2004, Thessalia/Sterea Ellas (€/hectare)

	> 5 ha	5 - 10 ha	10 -20 ha	20+
Costs excluding Family Labour				
Variable	1,007	964	1,028	1,345
Fixed	658	649	711	880
Total	1,665	1,613	1,740	2,225
Costs including Family Labour				
Variable	1,883	1,460	1,371	1,542
Fixed	755	704	750	902
Total	2,638	2,164	2,120	2,443

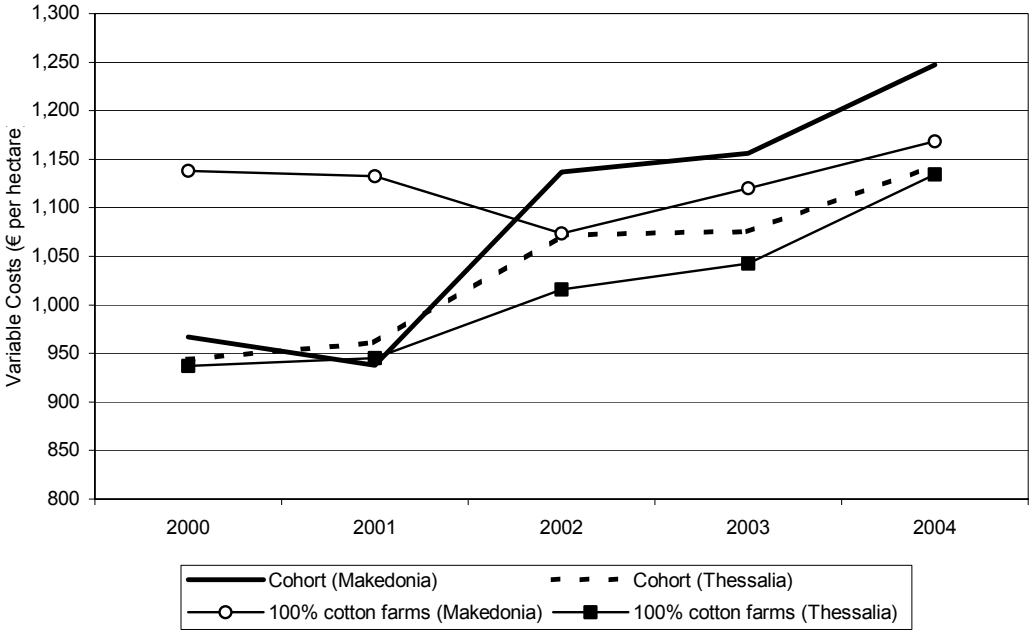
Source: LMC based on FADN data for 100% Cotton Farms.

Cohort Analysis for Greece

Examining variable costs (excluding family labour) for the cohort in the two Greek regions and comparing results for the sample of farms growing 100% cotton reveals reassuringly similar cost estimates for 2004.

The main difference in the observations for the 100% cotton farms and the cohorts is in Makedonia-Thraki, where the 100% cotton farm sample shows a very stable cost structure between 2000 and 2004, while the cohort shows rising costs. This latter observation of rising costs is more in line with both the 100% cotton farm and cohort results for Thessalia/Sterea Ellas (Diagram 3.9)

Diagram 3.9: Comparison between Variable Cost Estimates for Full FADN Samples of 100% Cotton Farms and A Constant Cohort, 2000-2004



Source: FADN

Cotton Production Costs Prior to the Regime Change - Spain

For farms growing 100% cotton, total variable costs (excluding unpaid labour) averaged €1,355 per hectare over the five years 2000-2004, with fixed costs of €420 per hectare (Table 3.11). However, there is considerable variation in the cost figures between years. This is found to be largely due to the changing sample.

In 2003 and 2004 costs were considerably higher than those of the earlier years. In these two years the sample size was larger for 100% cotton farms and the higher cost figures are consistent with data available from other sources. For instance the private sector database, which primarily covers the larger farmers, cotton variable production costs average €2,285 per hectare over the same period with yields averaging over 4 tonnes per hectare (Table 3.12).

Costs of over €2,000 per hectare are consistent with the FADN data for 2003 and 2004 once an allowance has been made for family labour (i.e., when we value it at the same price as that paid for hired labour).

For this reason, we base the rest of our analysis of the FADN data on the 2003 and 2004 results since these appear to provide a more accurate reflection of the state of the industry. Over these two years, total variable costs (excluding unpaid labour) averaged €1,647 per hectare with fixed costs of €322 per hectare.

The number of unpaid labour hours per hectare amounted to 182. Assuming that the opportunity cost of this labour is the paid wage, total costs for 2003 and 2004 averaged €2,960 per hectare (Table 3.11 and Diagram 3.10). Costs are higher on the smaller farms (Tables 3.13).

Table 3.11: Average Production Costs for 100% Cotton Farms, Spain, FADN (€/hectare)

	2000	2001	2002	2003	2004	2005 (e)
Variable Costs						
Seed	119.9	206.7	202.1	120.6	130.3	130.3
Fertiliser	146.7	189.3	286.3	230.4	253.6	253.6
Crop Protection	163.5	165.4	211.8	452.1	325.6	325.6
Other Specific Costs	54.5	61.4	62.0	72.6	71.9	74.3
Energy and Fuel	138.2	116.6	92.5	59.0	78.7	81.4
Contracted labour/services	196.8	152.7	162.7	308.6	464.8	464.8
Water/irrigation	93.4	73.6	76.3	165.4	237.2	237.2
Other Direct costs	27.4	46.2	46.5	55.6	94.2	94.2
Labour (paid)	85.2	94.7	113.6	96.3	76.6	76.6
Total Variable costs	1,025.6	1,106.6	1,253.8	1,560.6	1,732.8	1,732.8
Fixed Costs						
Machinery	46.5	54.2	66.4	44.5	58.8	58.8
Depreciation	261.1	121.9	87.1	75.7	61.8	61.8
Rent	180.3	255.5	323.7	199.7	188.2	182.1
Interest	25.7	20.4	15.8	9.1	5.1	5.1
Total Fixed Costs	513.6	452.0	493.0	329.1	313.9	313.9
Total Costs	1,539.2	1,558.7	1,746.8	1,889.7	2,046.7	2,046.7
Total Unpaid labour (hrs)	107.0	93.1	110.9	191.8	182.1	182.1
Average hourly wage	5.1	5.4	5.8	5.2	5.4	5.6
Total unpaid labour	542.3	504.9	647.4	994.6	990.5	1,023.9
Total cost including unpaid labour						
Variable Cost	1,513.7	1,561.1	1,836.5	2,455.7	2,624.3	2,654.3
Fixed Cost	567.8	502.5	557.7	428.5	412.9	416.3
Total Cost	2,081.5	2,063.6	2,394.2	2,884.3	3,037.2	3,070.6

Note: 1. To derive costs including family labour we have valued family labour at the paid labour rate
2. In deriving total costs it is assumed that 90% of unpaid labour is attributed to variable costs and 10% to fixed costs.

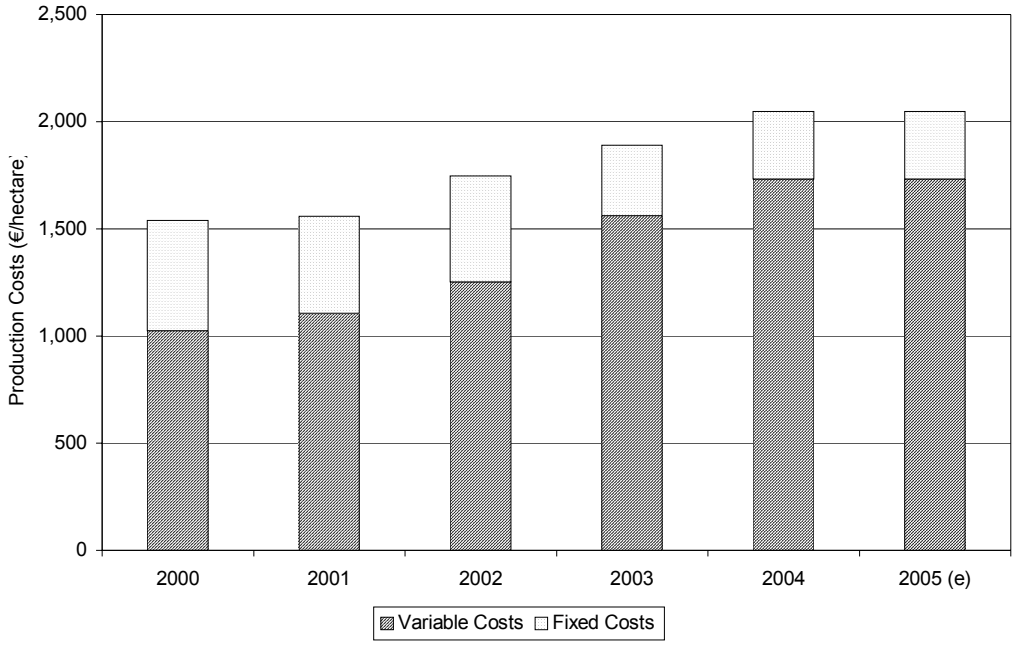
Sources: FADN, LMC.

Table 3.12: Cotton Variable Production Costs, Private Database (€ per hectare)

	2001/02	2002/03	2003/04	2004/05	2005/06
a. Seed	89	105	93	101	111
b. Fertiliser	272	239	240	230	250
c. Pesticides	444	588	789	475	479
d. Water	136	142	129	122	178
e. Energy and Fuel	7	3	13	2	3
f. Labour	236	236	454	504	364
g. Hired Labour/Contracted Services	794	775	595	615	638
h. Other Cultivation	291	259	145	188	92
Total Variable Cost	2,269	2,347	2,458	2,237	2,114

Source: Private Database, Appendix 3.

Diagram 3.10: Cotton Production Costs, Spain



Source: FADN.

Table 3.13: Cotton Production Costs by Farm Size, Average 2003 and 2004, Spain
(€/hectare)

	< 10 ha	10 -20 ha	20+
Costs excluding Family Labour			
Variable	1,705	1,573	1,601
Fixed	222	379	552
Total	1,927	1,952	2,153
Costs including Family Labour			
Variable	2,838	2,322	1,963
Fixed	348	462	592
Total	3,186	2,784	2,555

Source: LMC based on FADN data for 100% Cotton Farms.

Importance of Family/Unpaid Labour - Greece

We have based our estimates of family labour time on FADN data, which is a source that provides data across countries and crops. However, there are concerns regarding the reliability of these data. This arises from the nature of family labour; for instance, if a farmer's sole employment is in farming, the full year's labour time will be allocated to it, while in reality only a proportion of labour time is actually be spent on agricultural tasks. This is more of an issue on the smaller farmers where there may not be any other income earning activities.

Accordingly, the FADN estimates are likely to overestimate the amount of time spent on a particular crop and conversely underestimate the return to labour. In addition, there appear to be inconsistencies between the bases on which estimates were prepared of labour use for the same crops in different member states.

The FADN data suggest that the importance of family/unpaid labour for cotton production declines as the farm size increases.

The number of unpaid labour hours worked per hectare falls from 287 to 150 as the size of the farm increases in Makedonia-Thraki and from 362 to 81 in Thessalia/Sterea Ellas (Table 3.14).

Table 3.14: Greece, Unpaid Labour Hours (hours per hectare**)**

	2000	2001	2002	2003	2004	Average
Makedonia-Thraki						
>5ha	293	292	308	282	259	287
5-10ha	226	215	219	211	193	213
10-20ha	163	134	160	105	156	144
<20ha	236	70	200	121	122	150
Ipiros-Peloponi/Thessalia/Sterea Ellas						
>5ha	354	354	399	332	371	362
5-10ha	197	196	208	210	209	204
10-20ha	135	142	150	121	158	141
<20ha	79	80	62	95	87	81

Source: FADN.

Data from the questionnaires suggest that the number of unpaid labour hours is more constant over farm sizes than was the case with the FADN data, varying between 75 and 90 hours per hectare. The number of hours is found to be considerably less than those reported by FADN. The change in labour use in 2006 (Table 3.15) is discussed further in latter sections of this chapter.

According to the questionnaire responses, cotton is the most important user of family labour in all size categories. This has not changed much over the last five years.

Table 3.15: Greece, Labour Hours Spent on Cotton Production, 2005-06
(hours per hectare)

Farm Size	Labour	2005	2006	Change
<5ha	Household	89.55	90.94	2%
	Paid	39.89	32.23	-19%
	Contracted	25.08	28.57	14%
5-10ha	Household	79.13	87.62	11%
	Paid	32.61	29.86	-8%
	Contracted	6.39	5.86	-8%
10-20ha	Household	82.17	76.77	-7%
	Paid	22.41	27.23	22%
	Contracted	30.35	25.80	-15%
>20ha	Household	80.78	73.03	-10%
	Paid	28.64	28.74	0%
	Contracted	29.19	27.08	-7%
Total Labour				
<5ha		154.52	151.74	-2%
5-10ha		118.13	123.34	4%
10-20ha		134.94	129.80	-4%
>20ha		138.61	128.85	-7%

Note: Based on an 8 hour working day.

Source: Questionnaire.

Importance of Family/Unpaid Labour - Spain

As with Greece, the FADN data suggest that the importance of family/unpaid labour for cotton production declines as the farm size increases. The number of labour hours worked per hectare falls from 183 to 69 as the size of the farm increases (Table 3.16).

Table 3.16: Spain, Unpaid Labour Hours (hours per hectare)

	2000	2001	2002	2003	2004	Average
<10ha	166	125	151	238	236	183
10-20ha	94	83	102	162	151	119
>20ha	61	61	73	81	71	69

Source: FADN.

That labour time falls as size increases is confirmed by the questionnaire, although the hours worked per hectare are found to be less than in the FADN sample across all size categories (Table 3.17).

Table 3.17: Spain, Labour Hours Spent on Cotton Production, 2005-06 (hours per hectare)

Farm Size	Labour	2005	2006	Change
<10ha	Household	58.7	58.1	-1%
	Paid	0.3	-	
	Contracted	8.1	5.7	-30%
10-20ha	Household	57.2	55.2	-3%
	Paid	-	3.0	
	Contracted	9.8	9.1	-7%
>20ha	Household	23.1	24.6	6%
	Paid	12.5	9.3	-26%
	Contracted	4.4	3.4	-23%

Source: Questionnaire based on an 8 hour working day.

Production Costs for Competing Crops

For the competing crops, we restrict our analysis to durum wheat, maize and sunflower. These crops have historically been considered to be the main alternatives by farmers. Another alternative, which has become an option following the reform of the cereals regime[2], is soft wheat and since the adoption of the cereal reform in 2006, the area under soft wheat has increased, often at the expense of durum wheat. This is because the old cereal regime favoured the production of durum wheat.

However, in our analysis, at least for the first year following the regime, we discount soft wheat as an option, since cotton farmers' experience is overwhelmingly with growing durum wheat, rather than soft wheat. This practical constraint upon switching to soft wheat would be expected to weaken in the longer term.

For soft wheat, costs broadly are similar to those for durum wheat, although since soft wheat varieties are more disease-resistant than durum wheat, there is a reduction in pesticide use. Soft wheat yields are some 5% to 15% higher than those of durum wheat.

The analysis of **sunflower** is restricted to Spain. The FADN data imply that variable costs excluding family labour averaged €260 per hectare between 2000 and 2004, with unpaid labour hours averaging 52 hours per hectare. The stability in costs from 2004 is derived from the answers to the questionnaire (Table 3.18).

[2] This has occurred because, under the old cereals regime, substantial additional payments were made to growers of durum wheat in traditional areas.

Table 3.18: Average Sunflower Production Costs, Spain, FADN Definition (€/hectare)

	2000	2001	2002	2003	2004	2005 (e)
Total Costs (excl Family Labour)						
Variable Costs	130.5	239.9	307.2	305.4	317.1	317.1
Fixed Costs	39.8	47.9	65.4	102.7	90.3	90.3
Total costs	170.2	287.8	372.6	408.0	407.4	407.4
Total Unpaid labour (hrs)	40.6	45.3	40.4	75.5	59.8	59.8
Average hourly wage	5.1	5.4	5.8	5.2	5.4	5.6
Total unpaid labour	206.0	245.7	236.0	391.5	325.4	336.3
Total Costs (incl Family Labour)						
Variable Cost	315.9	461.0	519.6	657.7	609.9	619.8
Fixed Cost	60.4	72.5	89.0	141.8	122.8	123.9
Total Cost	376.2	533.5	608.6	799.5	732.8	743.7

Note: See Appendix 2 for greater detail on the components of costs

Source: 2003 and 2004 FADN, 2005 and 2006 based on questionnaire responses

For **durum wheat** production, from the FADN data, on average, variable costs (excluding family labour) in Greece were €360 per hectare between 2000 and 2004, with unpaid labour hours averaging 92 hours per hectare. The rise in costs since 2004 reflects the increased use of inputs reported by most producers in the questionnaire.

In Spain, variable costs excluding family labour averaged €337 per hectare between 2000 and 2004, with unpaid labour hours averaging 97 hours per hectare. The rise in costs in 2002 highlights one of the limitations of the FADN data mentioned above for cotton, notably the changing sample over time. In 2002, the FADN data appear to suggest a switch in the amounts of unpaid and paid labour. This seems, however, to be a result of the change in the sample rather than a shift in farming techniques. The stability in costs from 2004 is because most producers in the questionnaire reported no change in input use (Table 3.19).

For **maize** variable costs in Greece (excluding family labour) averaged €915 per hectare between 2000 and 2004, with unpaid labour hours averaging 211 hours per hectare[3]. The rise in costs after 2004 is a reflection of the questionnaire returns from producers, who reported an increased use of inputs.

In Spain, the FADN variable costs, excluding family labour, rose considerably between 2002 and 2003, in part due to the changing sample size. We take costs in 2003 and 2004 as being more representative of total costs as they are much more closely in line with the data obtained from the independent database (see Appendix 3).

Over these two years, variable costs excluding family labour, averaged €1,173 per hectare between, with unpaid labour hours averaging 121 hours per hectare (Table 3.20).

[3] According to the FADN data the unpaid labour hours for maize in Thessalia averaged 444 hours per annum, which was more than double that of Makedonia.

This is considered to be too high a labour use and we have assumed that unpaid labour hours are the same in Thessalia as in Makedonia.

Table 3.19: Average Durum Wheat Production Costs, FADN Definition (€/hectare)

	2000	2001	2002	2003	2004	2005 (e)
Makedonia						
Total Costs (excl Family Labour)						
Variable Costs	364.2	367.3	350.8	348.0	360.3	365.4
Fixed Costs	294.1	288.0	302.4	283.1	296.7	296.7
Total costs	658.2	655.3	653.2	631.1	657.1	662.1
Total Unpaid labour (hrs)	78.4	79.4	76.3	88.9	78.9	78.9
Average hourly wage	2.2	2.4	2.6	2.7	3.0	3.2
Total unpaid labour	174.5	190.5	194.8	242.1	240.3	253.1
Total Costs (incl Family Labour)						
Variable Cost	521.2	538.7	526.1	565.9	576.6	593.1
Fixed Cost	311.5	307.1	321.9	307.3	320.8	322.1
Total Cost	832.7	845.7	848.0	873.2	897.4	915.2
Thessalia/Sterea Ellas						
Total Costs (excl Family Labour)						
Variable Costs	340.4	364.0	398.5	317.2	387.3	395.2
Fixed Costs	228.9	214.4	226.7	263.7	253.5	253.5
Total costs	569.3	578.4	625.2	580.9	640.8	648.7
Total Unpaid labour (hrs)	123.1	129.0	89.6	92.4	97.9	97.9
Average hourly wage	2.2	2.4	2.6	3.0	3.1	3.2
Total unpaid labour	274.9	313.3	237.1	281.4	303.3	314.1
Total Costs (incl Family Labour)						
Variable Cost	587.9	646.0	611.9	570.5	660.3	677.9
Fixed Cost	256.4	245.7	250.4	291.8	283.8	284.9
Total Cost	844.3	891.7	862.3	862.3	944.1	962.8
Spain						
Total Costs (excl Family Labour)						
Variable Costs	269.1	345.9	425.9	297.8	346.0	346.0
Fixed Costs	65.6	91.9	188.8	84.5	77.6	77.6
Total costs	334.7	437.8	614.7	382.3	423.7	423.7
Total Unpaid labour (hrs)	49.3	93.9	59.7	148.5	134.0	134.0
Average hourly wage	5.1	5.4	5.8	5.2	5.4	5.6
Total unpaid labour	249.9	509.5	348.6	769.7	728.7	753.2
Total Costs (incl Family Labour)						
Variable Cost	494.0	804.4	739.6	990.6	1,001.9	1,024.0
Fixed Cost	90.6	142.8	223.7	161.5	150.5	152.9
Total Cost	584.6	947.3	963.3	1,152.0	1,152.3	1,176.9

Note: See Appendix 2 for greater detail on the components of costs

Source: 2003 and 2004 FADN, 2005 and 2006 based on questionnaire responses

Table 3.20: Average Maize Production Costs, FADN Definition (€/hectare)

	2000	2001	2002	2003	2004	2005 (e)
Makedonia						
Total Costs (excl Family Labour)						
Variable Costs	912.4	742.6	936.8	971.9	959.4	972.6
Fixed Costs	623.2	560.8	653.4	607.3	534.2	534.2
Total costs	1,535.7	1,303.4	1,590.1	1,579.2	1,493.6	1,506.8
Total Unpaid labour (hrs)	252.5	217.7	199.9	190.1	193.8	193.8
Average hourly wage	2.2	2.4	2.6	2.7	3.0	3.2
Total unpaid labour	562.3	522.0	510.6	517.6	590.6	622.0
Total Costs (incl Family Labour)						
Variable Cost	1,418.5	1,212.4	1,396.3	1,437.7	1,490.9	1,532.4
Fixed Cost	679.5	613.0	704.4	659.1	593.3	596.4
Total Cost	2,097.9	1,825.4	2,100.7	2,096.8	2,084.1	2,128.8
Thessalia/Sterea Ellas						
Total Costs (excl Family Labour)						
Variable Costs	935.3	911.3	904.1	929.0	953.9	973.7
Fixed Costs	376.2	294.0	502.9	489.8	525.5	525.5
Total costs	1,311.5	1,205.4	1,407.1	1,418.7	1,479.5	1,499.3
Total Unpaid labour (hrs)	252.5	217.7	199.9	190.1	193.8	193.8
Average hourly wage	2.2	2.4	2.6	3.0	3.1	3.2
Total unpaid labour	564.0	528.9	529.2	579.2	600.6	622.0
Total Costs (incl Family Labour)						
Variable Cost	1,187.1	1,089.0	1,180.7	1,180.4	1,133.8	1,156.2
Fixed Cost	432.6	346.9	555.8	547.7	585.6	587.7
Total Cost	1,619.7	1,435.9	1,736.5	1,728.0	1,719.4	1,743.9
Spain						
Total Costs (excl Family Labour)						
Variable Costs	528.9	791.7	847.1	1,149.5	1,185.2	1,185.2
Fixed Costs	360.1	142.5	154.6	195.3	383.7	383.7
Total costs	889.0	934.2	1,001.8	1,344.8	1,568.8	1,568.8
Total Unpaid labour (hrs)	60.1	119.1	113.8	159.9	103.0	103.0
Average hourly wage	5.1	5.4	5.8	5.2	5.4	5.6
Total unpaid labour	304.5	646.1	664.1	829.0	560.4	579.3
Total Costs (incl Family Labour)						
Variable Cost	803.0	1,373.3	1,444.8	1,895.6	1,689.5	1,706.5
Fixed Cost	390.5	207.1	221.0	278.2	439.7	441.6
Total Cost	1,193.5	1,580.3	1,665.8	2,173.8	2,129.2	2,148.1

Note: According to the FADN data the unpaid labour hours for Maize in Thessalia averaged 444 hours per annum, this was more than double that of Makedonia. This is considered to be too high a labour use and we have assumed that unpaid labour hours are the same Thessalia as Makedonia.

See Appendix 2 for greater detail on the components of costs

Source: 2003 and 2004 FADN, 2005 and 2006 based on questionnaire responses

Gross Margins for Cotton and Competing Crops Prior to the Cotton Regime Change

Gross margins for cotton and the competing crops are presented in Tables 3.21 to 3.24. In analysing the gross margins, we focus on the measure of gross margin that excludes an imputed return for family labour, since this proved to be the preferred method of measuring profitability citied by growers[4]. We also examine the return to family labour. Given the difficulties in family labour estimates, we base family labour use on the average number of hours reported across farm sizes.

When we consider average gross margins over the 2000 to 2005 period, the margins are highest for cotton when compared to the competing crops. Returns to labour were also highest (Diagram 3.11 and 3.12).

This was confirmed by findings from the questionnaire, in that most producers stated that, in the past cotton, was the most profitable crop they cultivated. However, the level of profitability was such that incentives acted to maintain production, rather than expand it.

Following the reform to the old regime in 2000, when further penalties were introduced if production exceeded 1.5 million tonnes of unginned cotton, the level of cotton output stabilised. The level of penalties in this case appears to have been sufficient to discourage additional production. This is in contrast to previous regimes, under which production continued to expand (Diagram 3.3).

Yet, the level of production was still greater than the NGQ and hence penalties continued to be imposed. The level of overproduction was greater in Greece than Spain.

Table 3.21: Returns to Sunflower: Spain (€ per hectare)

	2000	2001	2002	2003	2004	2005
Revenue						
Income per tonne (€/t)	174.5	248.8	232.4	218.4	244.3	261.0
Coupled Payment (€/ha)	239.4	239.4	239.4	239.4	239.4	239.4
Yield (t/ha)	1.8	1.8	2.3	2.0	2.9	2.2
Total Revenue	553.4	699.3	772.8	679.9	942.2	805.1
Gross Margin						
Gross Margin (excluding family labour)	422.9	459.4	465.6	374.5	625.1	487.9
Return to family labour (per hour)	10.4	10.1	11.5	5.0	10.4	8.2
Gross Margin (including family labour)	237.5	238.3	253.2	22.2	332.2	185.3
Total Profit (excluding family labour)	383.1	411.5	400.2	271.9	534.8	397.7
Return to family labour (per hour)	9.4	9.1	9.9	3.6	8.9	6.6
Total Profit (including family labour)	177.1	165.8	164.2	-119.6	209.4	61.3

Source: LMC, derived from FADN and Questionnaires.

[4] In The questionnaire growers were asked how they measures profitability. The most common response in both Greece and Spain was revenue minus cash costs.

Table 3.22: Returns to Cotton (€ per hectare)

	2000	2001	2002	2003	2004	2005	Average
Makedonia-Thraki							
Revenue							
Price per tonne (€/t)	854.5	720.7	807.5	943.5	781.2	839.0	818.4
Yield (t/ha, unginned)	3.2	3.5	3.4	2.7	3.1	3.1	3.2
Total Revenue	2,702.5	2,491.7	2,764.9	2,506.0	2,442.8	2,638.7	2,568.8
Gross Margin							
Gross Margin (excluding family labour)	1,564.7	1,359.2	1,691.1	1,386.2	1,274.2	1,470.1	1,436.1
Return to family labour (per hour)	6.4	5.9	7.1	6.6	6.5	7.6	6.7
Gross Margin (including family labour)	1,075.2	863.3	1,140.5	873.8	740.5	917.4	907.1
Total Profit (excluding family labour)	866.6	611.0	818.0	526.0	360.3	556.3	574.3
Return to family labour (per hour)	3.5	2.7	3.4	2.5	1.9	2.9	2.7
Total Profit (including family labour)	322.7	60.1	206.3	-43.3	-232.6	-57.8	-13.5
Ipiros-Peloponi/Thessalia/Sterea Ellas							
Revenue							
Price per tonne (€/t)	869.8	794.2	825.2	945.4	797.8	867.0	845.9
Yield (t/ha, unginned)	3.3	3.6	3.6	3.2	3.5	3.6	3.5
Total Revenue	2,858.9	2,848.9	3,004.8	3,067.1	2,783.9	3,164.2	2,973.8
Gross Margin							
Gross Margin (excluding family labour)	1,921.6	1,903.6	1,988.7	2,024.7	1,649.9	2,030.2	1,919.4
Return to family labour (per hour)	8.3	7.9	8.0	9.6	7.5	9.2	8.5
Gross Margin (including family labour)	1,456.6	1,379.8	1,397.5	1,448.7	1,035.6	1,394.0	1,331.1
Total Profit (excluding family labour)	1,248.5	1,261.5	1,281.6	1,306.1	1,011.3	1,391.6	1,250.4
Return to family labour (per hour)	5.4	5.3	5.2	6.2	4.6	6.3	5.5
Total Profit (including family labour)	731.8	679.5	624.7	666.1	328.8	684.8	596.8
Spain							
Revenue							
Price per tonne (€/t)	1,028.9	853.5	1,012.6	1,054.4	876.2	908.0	940.9
Yield (t/ha, unginned)	4.0	3.5	3.4	3.3	4.0	4.2	3.7
Total Revenue	4,101.3	2,958.9	3,431.4	3,497.2	3,499.2	3,790.9	3,435.5
Gross Margin							
Gross Margin (excluding family labour)	3,075.7	1,852.2	2,177.6	1,936.6	1,766.4	2,058.1	1,958.2
Return to family labour (per hour)	28.7	19.9	19.6	10.1	9.7	11.3	14.1
Gross Margin (including family labour)	2,587.6	1,397.8	1,594.9	1,041.5	875.0	1,136.6	1,209.1
Total Profit (excluding family labour)	2,562.1	1,400.2	1,684.6	1,607.5	1,452.5	1,744.2	1,577.8
Return to family labour (per hour)	23.9	15.0	15.2	8.4	8.0	9.6	11.2
Total Profit (including family labour)	2,019.7	895.3	1,037.2	613.0	462.0	720.3	745.5

Source: LMC, derived from FADN and Questionnaires

Table 3.23: Returns to Durum Wheat (€ per hectare)

	2000	2001	2002	2003	2004	2005	Average
Makedonia							
Revenue							
Income per tonne (€/t)	134.4	147.6	136.2	152.7	128.1	159.0	144.7
Coupled Payment (€/ha)	151.2	151.2	151.2	151.2	151.2	155.6	152.1
Durum Wheat zone supplement (€/ha)	344.5	344.5	344.5	344.5	327.0	344.5	341.0
Yield (t/ha)	2.2	2.4	2.6	2.7	3.3	3.3	2.8
Total Revenue	795.0	849.6	843.6	911.5	901.0	1,020.0	905.1
Gross Margin							
Gross Margin (excluding family labour)	430.9	482.4	492.8	563.5	540.6	654.7	546.8
Return to family labour (per hour)	5.5	6.1	6.5	6.3	6.9	8.3	6.8
Gross Margin (including family labour)	136.8	194.3	190.5	280.4	243.9	357.9	253.4
Total Profit (excluding family labour)	273.8	310.9	317.5	345.6	306.4	422.6	340.6
Return to family labour (per hour)	3.5	3.9	4.2	3.9	3.9	5.4	4.2
Total Profit (including family labour)	499.0	553.6	547.6	615.5	605.0	724.0	609.1
Thessalia							
Revenue							
Income per tonne (€/t)	139.8	149.9	149.2	152.5	133.7	159.0	148.8
Coupled Payment (€/ha)	151.2	151.2	151.2	151.2	151.2	155.6	152.1
Durum Wheat zone supplement (€/ha)	344.5	344.5	344.5	344.5	327.0	344.5	341.0
Yield (t/ha)	3.7	3.6	3.7	3.5	3.9	4.1	3.8
Total Revenue	1,019.0	1,037.9	1,045.5	1,029.9	1,002.9	1,146.7	1,052.6
Gross Margin							
Gross Margin (excluding family labour)	678.6	673.8	647.0	712.7	615.6	751.5	680.1
Return to family labour (per hour)	5.5	5.2	7.2	7.7	6.3	7.7	6.8
Gross Margin (including family labour)	431.1	391.9	433.6	459.4	342.6	468.8	419.2
Total Profit (excluding family labour)	449.6	459.5	420.3	449.0	362.1	505.9	439.3
Return to family labour (per hour)	3.7	3.6	4.7	4.9	3.7	5.2	4.4
Total Profit (including family labour)	174.7	146.2	183.2	167.6	58.8	183.9	147.9
Spain							
Revenue							
Income per tonne (€/t)	126.1	159.8	125.7	135.7	147.0	134.0	140.4
Coupled Payment (€/ha)	239.4	239.4	239.4	239.4	239.4	239.4	239.4
Durum Wheat zone supplement (€/ha)	250.5	250.5	302.5	226.1	229.8	229.8	247.7
Yield (t/ha)	3.8	3.5	3.1	3.8	3.4	3.4	3.4
Total Revenue	964.4	1,047.4	929.6	978.6	968.4	924.2	969.6
Gross Margin							
Gross Margin (excluding family labour)	695.3	701.5	503.6	680.7	622.3	578.2	617.3
Return to family labour (per hour)	14.1	7.5	8.4	4.6	4.6	4.3	5.9
Gross Margin (including family labour)	470.4	243.0	189.9	-12.0	-33.5	-99.7	57.5
Total Profit (excluding family labour)	629.7	609.6	314.8	596.2	544.7	500.6	513.2
Return to family labour (per hour)	12.8	6.5	5.3	4.0	4.1	3.7	4.7
Total Profit (including family labour)	379.8	100.1	-33.7	-173.4	-183.9	-252.6	-108.7

Note: Yields for durum wheat among cotton farmers in Makedonia are reported as just 1.5 tonnes per hectare in 2004 by FADN. This is considered to be too low and we have raised yields in accordance to the responses in the questionnaires where respondants were asked about the yields of competing crops.

Source: LMC, derived from FADN and Questionnaires

Table 3.24: Returns to Maize (€ per hectare)

	2000	2001	2002	2003	2004	2005 (e)	Average
Makedonia							
Revenue							
Income per tonne (€/t)	135.2	139.7	141.8	143.3	139.2	146.0	142.0
Coupled Payment (€/ha)	540.5	540.5	540.5	540.5	540.5	540.5	540.5
Yield (t/ha)	11.5	11.8	11.8	11.6	12.0	12.1	11.9
Total Revenue	2,089.2	2,344.8	2,285.1	2,313.2	2,279.6	2,308.2	2,306.2
Gross Margin							
Gross Margin (excluding family labour)	1,176.8	1,451.5	1,276.5	1,234.8	1,247.4	1,329.5	1,307.9
Return to family labour (per hour)	4.7	6.7	6.4	6.5	6.4	6.9	6.6
Gross Margin (including family labour)	670.7	981.7	816.9	768.9	715.9	769.7	810.6
Total Profit (excluding family labour)	553.6	890.8	623.1	627.4	713.2	808.5	732.6
Return to family labour (per hour)	2.2	4.1	3.1	3.3	3.7	4.2	3.7
Total Profit (including family labour)	-8.7	368.7	112.5	109.9	122.7	173.3	177.4
Thessalia							
Revenue							
Income per tonne (€/t)	151.1	151.2	149.8	152.7	144.6	146.0	148.9
Coupled Payment (€/ha)	540.5	540.5	540.5	540.5	540.5	540.5	540.5
Yield (t/ha)	11.5	11.9	11.6	11.6	12.0	12.1	11.9
Total Revenue	2,278.5	2,344.8	2,285.1	2,313.2	2,279.6	2,308.2	2,306.2
Gross Margin							
Gross Margin (excluding family labour)	1,343.3	1,433.4	1,381.0	1,384.3	1,325.6	1,334.5	1,371.8
Return to family labour (per hour)	5.3	6.6	6.9	7.3	6.8	6.9	6.9
Gross Margin (including family labour)	1,091.5	1,255.8	1,104.5	1,132.9	1,145.8	1,152.0	1,158.2
Total Profit (excluding family labour)	1,343.3	1,433.4	1,381.0	1,384.3	1,325.6	1,334.5	1,371.8
Return to family labour (per hour)	5.3	6.6	6.9	7.3	6.8	6.9	6.9
Total Profit (including family labour)	658.8	908.8	548.6	585.2	560.2	564.2	633.4
Spain							
Revenue							
Income per tonne (€/t)	146.5	133.3	142.3	126.3	133.5	127.0	132.5
Coupled Payment (€/ha)	151.2	433.9	403.9	387.6	383.3	383.3	398.4
Yield (t/ha)	12.4	11.4	12.0	10.5	12.3	12.3	11.7
Total Revenue	1,974.5	1,947.4	2,104.2	1,714.2	2,019.2	1,939.7	1,944.9
Gross Margin							
Gross Margin (excluding family labour)	1,445.6	1,155.7	1,257.1	564.6	834.0	754.6	913.2
Return to family labour (per hour)	24.1	9.7	11.0	3.5	8.1	7.3	7.9
Gross Margin (including family labour)	1,171.6	574.1	659.4	-181.5	329.7	233.2	323.0
Total Profit (excluding family labour)	1,085.5	1,013.2	1,102.5	369.4	450.3	370.9	661.3
Return to family labour (per hour)	18.1	8.5	9.7	2.3	4.4	3.6	5.7
Total Profit (including family labour)	781.1	367.1	438.4	-459.6	-110.0	-208.4	5.5

Source: LMC, derived from FADN and Questionnaires.

Diagram 3.11: Gross Margin, Cotton vs. Alternative Crops

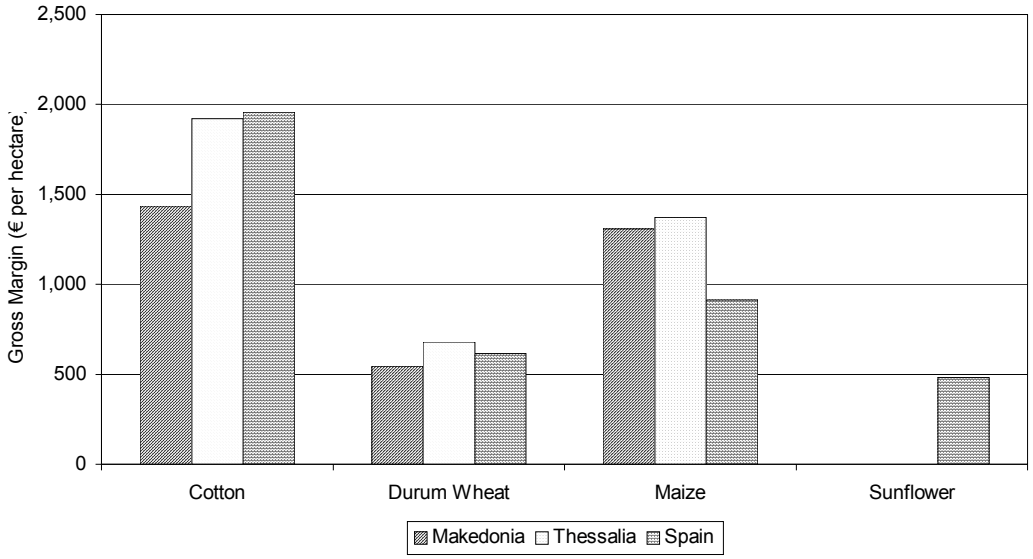
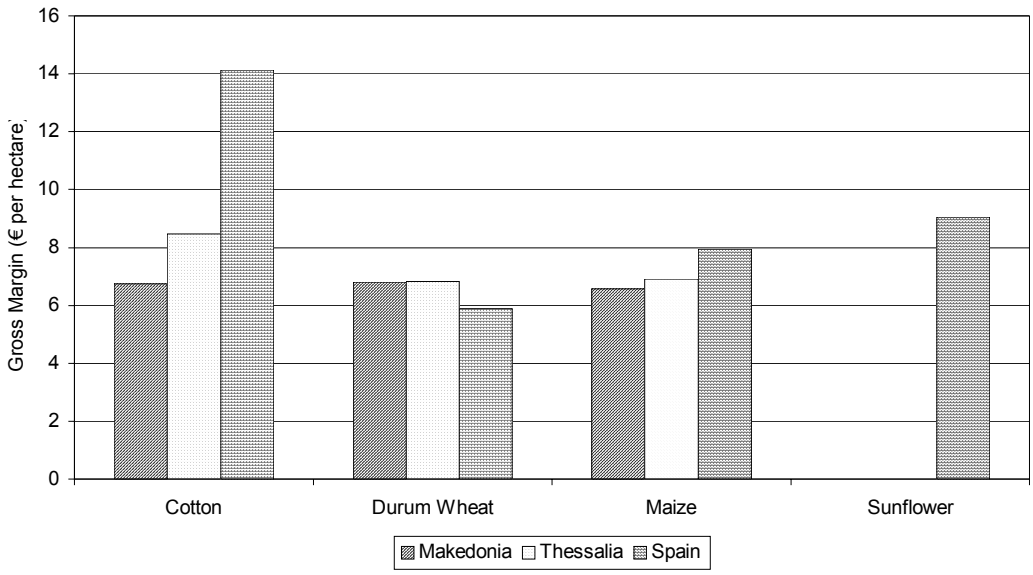


Diagram 3.12: Returns to Family Labour per Day, Cotton vs. Alternative Crops



Change in Costs following the Change in the Cotton Regime - Greece

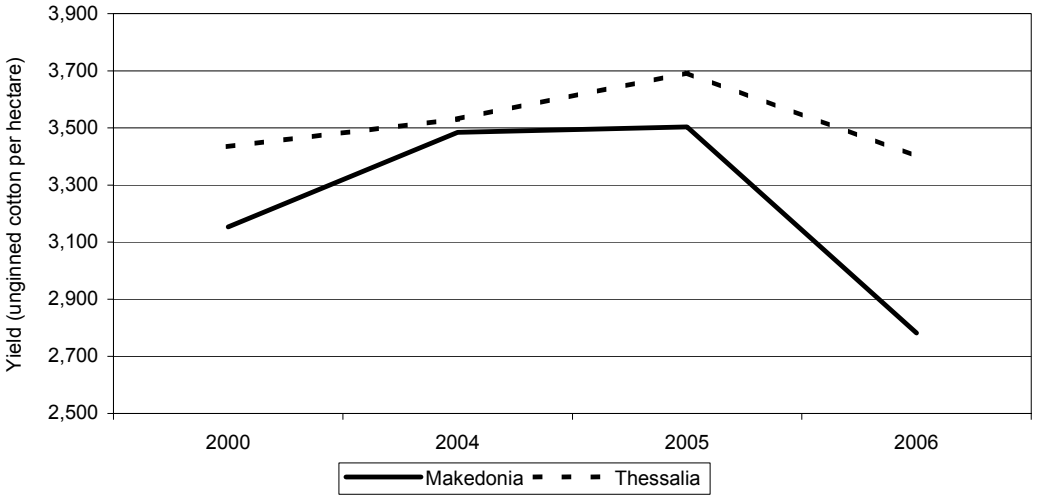
Our analysis of the impact of the reform on production costs is based on questionnaire responses, particularly to questions related to yields, labour and input use and costs.

The results show a significant drop in yields in 2006. On average, yields fell by 14%, with the largest falls being in the Makedonia-Thraki area where yields fell by over 20% (Diagram 3.13). By size, the strongest fall was in farms of between 10 to 20 hectares.

This fall in yields occurred despite most farmers stating that input use in 2006 was unchanged from 2005 levels (Diagrams 3.14 and 3.15). An explanation for this apparent contradiction emerged from discussions with stakeholders, who revealed that a major cause of the reduction in yields was bad weather. Unseasonal rains in October and November, at the time of the harvest, considerably reduced yields.

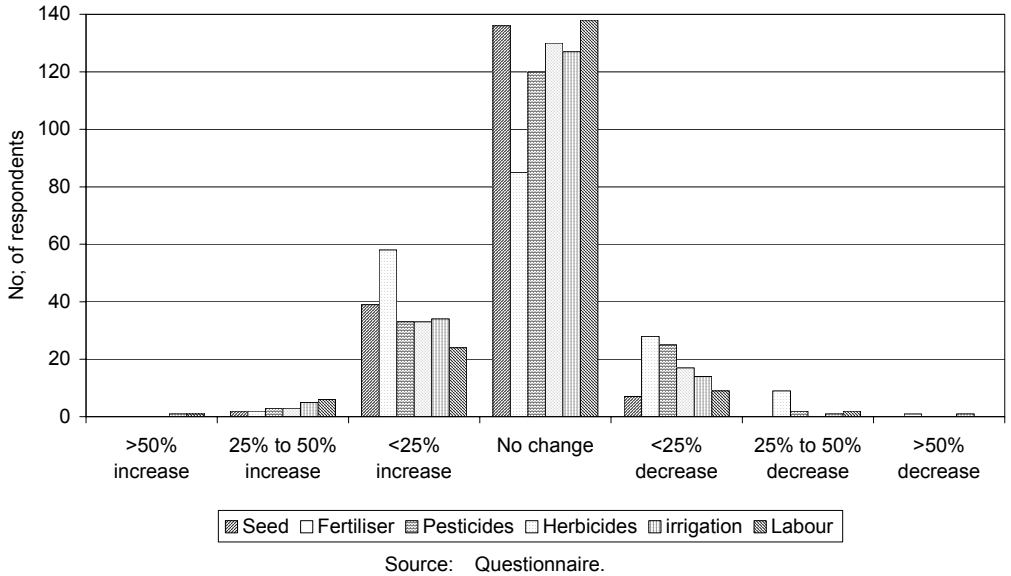
To gain an impression of how much of the yield reduction can be attributed to the poor weather as opposed to other factors, we consider the yield decreases for farmers who stated that they did not change their level of inputs in 2006. For these farms we find that yields in Makedonia-Thraki fell by 21%, while yields in Thessalia/Sterea Ellas fell by 7%. In both cases, this is close to the average fall across the whole of the sample.

Diagram 3.13: Average Cotton Yields, Greece



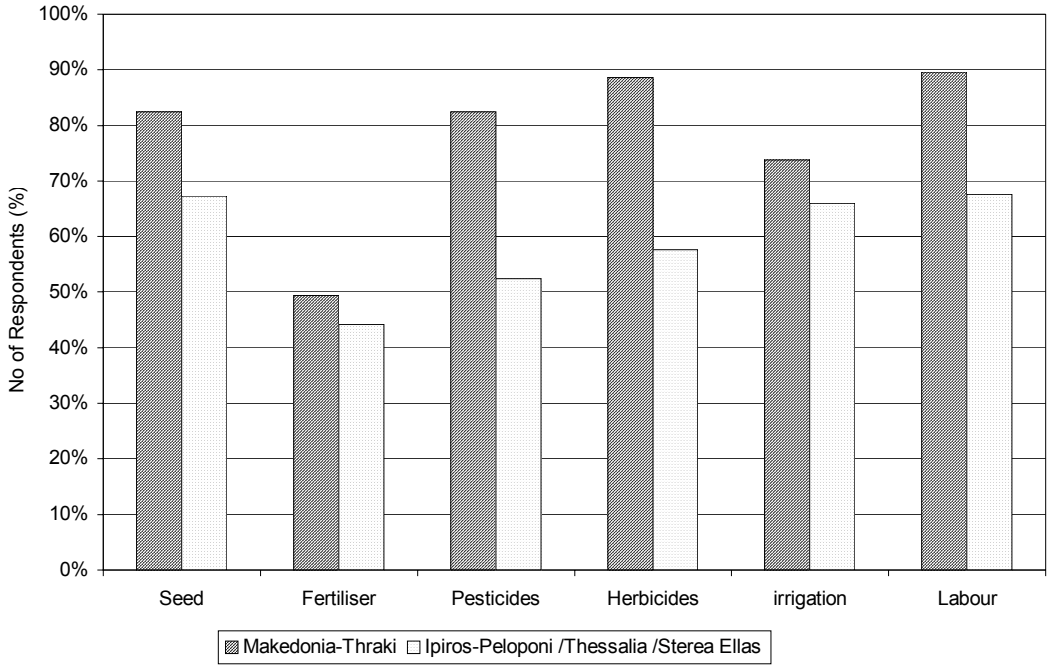
Source: FADN, Questionnaire survey.

Diagram 3.14: Change in Greek per Hectare Input Use for Cotton, 2006 vs. 2005



Source: Questionnaire.

Diagram 3.15: Number of Respondents Reporting No Change in Per Hectare Input Use for Cotton, 2006 v 2005



Note: For fertilisers 46% of respondents reported no change in inputs, 35% reported an increase and 16% a decrease
Source: Questionnaire.

To calculate costs for 2006, for the change in input costs we have used a weighted average of the responses concerning the change in inputs from the questionnaire (Diagram 3.14 and 3.15).

For labour, we use the same methodology, although additional information can be gleaned from the specific questions about the use of labour. In particular when asked about the amounts of labour time spent on cotton during 2005 and 2006, household labour time was reported to be virtually unchanged between the two years, while paid labour fell and contracted labour time rose (Table 3.25). This is a similar finding to that revealed in the questions concerning the change in inputs, where 72% of respondents reported unchanged labour use in 2006 vis-à-vis 2005 (Diagram 3.15). We maintain fixed costs at their 2004 level.

Table 3.25: Days per Hectare Spent on Cotton Production, Greece, 2006 vs. 2005

Labour	2006	2005	Change
Household	10	10	0%
Paid	4	4	-3%
Contracted	3	3	6%

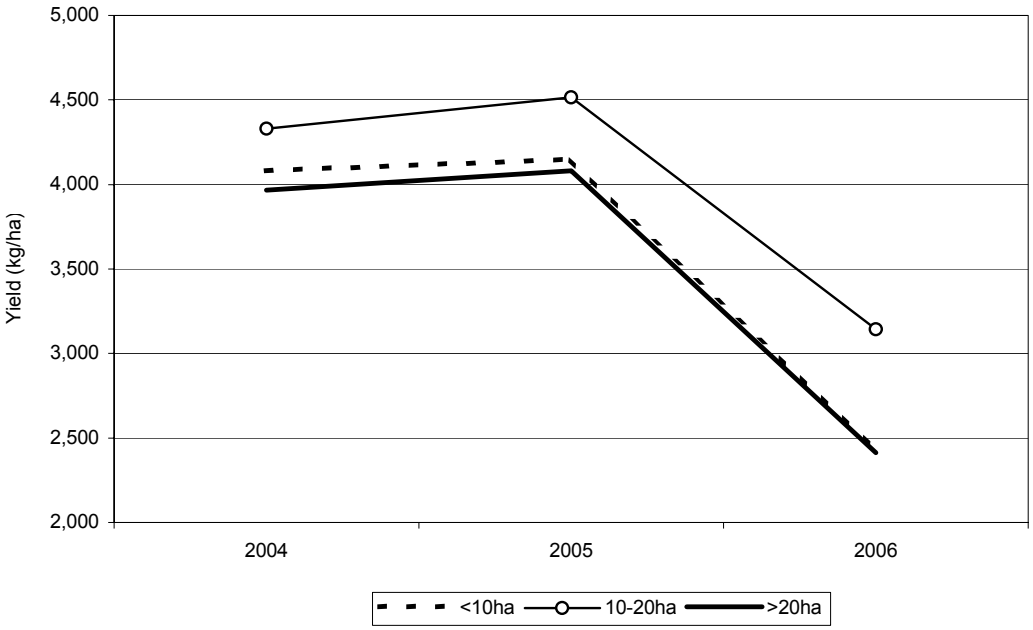
Source: Questionnaire, from a sample of 200 cotton growers.

The resulting estimates of production costs reveal that variable costs (excluding family labour) on 100% cotton farms rose by 3% in Makedonia-Thraki in 2006 compared to 2005, while variable costs (excluding family labour) rose by 5% in Thessalia/Sterea Ellas.

Change in Costs following the Change in the Cotton Regime - Spain

An analysis of the private database and the results from the questionnaire reveal a significant reduction in yields in 2006. For farms surveyed for the private database, average yields fell by 44% to 2.5 tonnes of unginned cotton per hectare, while in the farms surveyed for the questionnaire yields fell to 2.5 tonnes among the largest and smallest farms and to 3.1 tonnes per hectare in the farms of between 10 to 20 hectares (Diagram 3.16).

Diagram 3.16: Average Cotton Yields, Spain



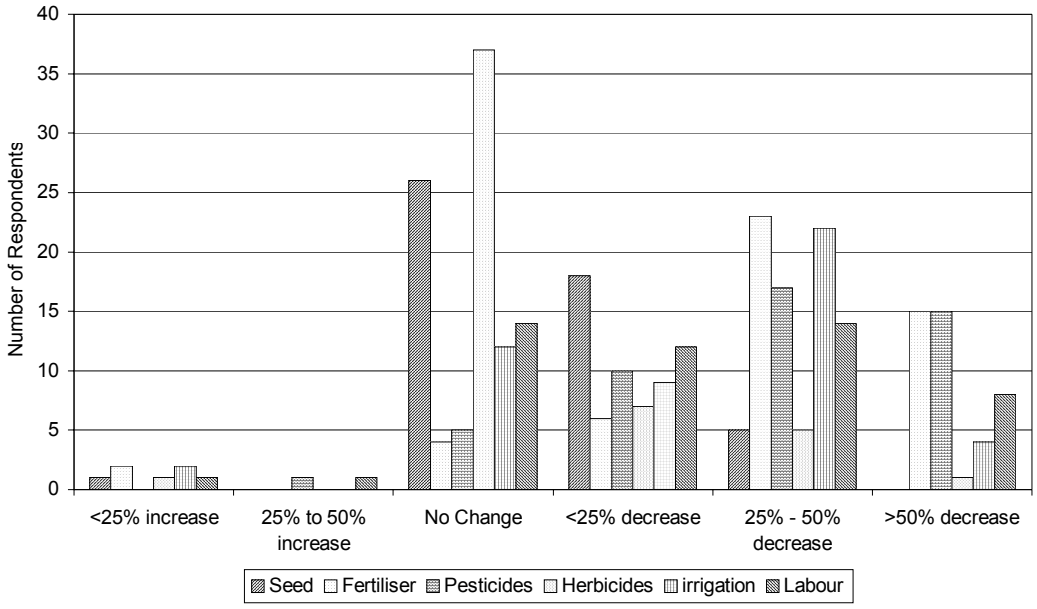
Source: Questionnaire

From both the private database and the questionnaire responses it is evident that the reason for the fall in yields was a reduction in input use. In the private database this may be seen in a reduction in input costs, particularly fertiliser and labour (see Appendix 3). In the questionnaire, farmers were asked how their input use had changed between 2005 and 2006. Inputs were found to be lower for fertiliser, pesticides and labour, as revealed in Diagram 3.17.

To calculate the change in input costs for 2006 we have used a weighted average of the responses from the questionnaire concerning the change in inputs (Diagram 3.16). For labour, we use the same methodology, although additional information can be gained from the specific labour questions. In particular, when asked about the amounts of labour time spent on cotton during 2005 and 2006, household labour time was reported to be virtually unchanged between the two years, while paid and contracted labour time fell (Table 3.26).

The falls in paid and contracted labour time were of a similar magnitude to those revealed by in the questions concerning the change in inputs. We assume that fixed costs remain constant. Under these assumptions, average variable costs (excluding family labour) fell by 23% to €1,328 per hectare during 2006.

Diagram 3.17: Changes in Spanish Cotton Farming Input Use per Hectare, 2006 vs. 2005



Source: Questionnaire

Table 3.26: Days Spent on Cotton Production Per Hectare

Labour	2005	2006	Change
Household	4.40	4.48	2%
Paid	1.03	0.80	-22%
Contracted	0.74	0.58	-22%

Source: Questionnaire.

COTTON GROSS MARGINS IN 2006 FOLLOWING THE COTTON REFORM

Following the reforms in 2006, the returns to cotton farmers that were tied to cotton production (i.e., were not decoupled) changed from a single payment from the ginners, which included the Aid, to a payment from the ginner (based on the world price) plus a cotton area payment (the coupled payment). In addition, some farmers received an additional payment where their production systems complied with certain agri-environmental norms. These programmes are discussed separately under each of the following country sections, since the programmes are different in each region.

The returns to the competing cereals were also decoupled. In the case of Greece, cereals were fully decoupled, while in Spain 25% of the support remained coupled.

The gross margins do not include the decoupled payment, since these do not affect returns when producers make their crop choices at the margin.

Greece

Following the cotton sector reform, in Makedonia-Thraki, the per tonne cotton sales price fell from €839 per tonne in 2005 to €317 in 2006. The main difference was that in 2005 the price included the Aid, whereas in 2006 it did not. The coupled cotton area payment was €529 per hectare. With lower yields per hectare, revenues fell from €2,639 per hectare in 2005 to €1,320 per hectare in 2006. With more normal yields, in the absence of adverse weather conditions, revenues would have been €191 per hectare higher (Table 3.27).

The gross margin (excluding household labour) fell €132 per hectare, but the area under cotton rose. Part of the reason for the fall in gross margin was a fall in yields owing to adverse weather conditions. In the absence of poor weather, the gross margin would have been €323 per hectare (Table 3.27). For the respondents in the survey, the area rose by 6%.

The decoupling of cereals prices meant that the returns to other crops also fell from their levels in 2005. For durum wheat the gross margin fell to €37 per hectare, while for maize the gross margin fell to €677 per hectare (Table 3.27).

Table 3.27: Makedonia - Returns Following Reform to the Cotton Regime (€ per hectare)

	Cotton (Normal yields)	Cotton (2006)	Durum Wheat	Maize
Price per tonne (€/t)	317	317	147	143
Yield (t/ha, unginned)	3.1	2.5	2.6	11.8
Coupled Payment (€/ha)	528.6	528.6	0.0	0.0
Durum Wheat zone supplement (€/ha)			0.0	
Quality premium ((€/ha)			40.0	
Agro-environmental payment				
Total Revenue	1,511	1,320	418	1,690
Variable Cost (excluding Family Labour)	1,188	1,188	381	1,013
Gross Margin	323	132	37	677
Unpaid Labour (hrs)	195	195	79	194
Return to unpaid labour	1.7	0.7	0.5	3.5

Note: Prices for the cereals are based on the average prices of the past three years. This is to reflect farmers' price expectations.

Source: LMC, Tables 3.22 to 3.24.

In Thesalia/Sterea Ellas where the fall in yields was not as significant, revenues fell from €3,164 per hectare in 2005 to €1,567 per hectare in 2006.

In Thessalia, a number of farmers also receive agri-environmental payments under the Decline of Nitrification Agri-environmental Measure. This programme is currently limited to 93,000 hectares in the Thessalia/Sterea Ellas region. This measure existed prior to the reform and there was no increase in the number of hectares covered by the programme in 2006. For farmers receiving this payment, costs are reduced as the amount of fertiliser that is permitted is reduced. Under the programme, farmers are

required to reduce fertiliser use by 20% and reduce water use. In the latter case, this can be achieved via (i) constant set-aside (for 5 years) of cultivated irrigated area equal to 25% of the farmer's irrigated land that is eligible for the measure, or (ii) crop rotation of at least 25% (from cotton to any non-irrigated annual crop) of the farmer's irrigated land that is eligible for the measure. For farmers receiving the payment, revenues fell to €1,843 per hectare for farms receiving the payment in 2006.

Where agri-environmental payments were being received, the gross margin fell to €716 per hectare; for producers not receiving such payments the gross margin fell to €390 per hectare (Table 3.28). A reduction in yields due to adverse weather conditions was less of a factor in Thessalia/Sterea Ellas than was the case in Makedonia-Thraki. For the respondents in the survey, the area was virtually unchanged from the 2005 level.

The higher return to cotton production which receives the agri-environmental payment than to cotton production that does not receive the payment is partly due to the method of calculating the payment. For instance, where land is set aside, the calculation is based on the income forgone by this action. The calculation is based on income and revenue figures prior to the change in regime. The income foregone is calculated as the 25% set aside multiplied by the average profit for irrigated crops €1,840 pr hectare. Using our numbers, based on gross margins, prior to the reform the calculation would have been 25% of the gross margin of €1,919 per hectare (the average gross margin, Table 3.21). Following the reform the gross margin has fallen to €390 per tonne (Table 3.28); hence the correct calculation of the environmental payment should be 25% of €390. The difference in the two calculations is the extent of the over-compensation under the agri-environmental measure, following the reforms.

Table 3.28: Thessalia - Returns Following the Reform to the Cotton Regime (€ per hectare)

	Cotton	Cotton (agri-environ payments)	Durum Wheat	Maize
Price per tonne (€/t)	309	309	147	143
Yield (t/ha, unginned)	3.4	2.5	3.9	11.6
Coupled Payment (€/ha)	528.6	528.6	0.0	0.0
Durum Wheat zone supplement (€/ha)			0.0	
Quality premium ((€/ha)			40.0	
Agro-environmental payment		542.0		
Total Revenue	1,567	1,843	611	1,655
Variable Cost (excluding Family Labour)	1,177	1,127	429	1,049
Gross Margin	390	716	182	605
Unpaid Labour (hrs)	220	230	98	194
Return to unpaid labour	1.8	3.1	1.9	3.1

Note: Prices for the cereals are based on the average prices of the past three years. This is to reflect farmers' price expectations.

The production cost calculation for agri-environmental payments is based on the production cost for cotton reduced by the reduction in fertiliser cost (20%)

Source: LMC, Table 3.22 to 3.24.

Despite the fall in gross margins, the area under cotton rose in Greece in 2006. According to the questionnaire responses, most of this increase was in Makedonia (Table 3.29). The reason for this unexpected result emerged when we considered the change in gross margins for durum wheat (the crop that was considered as the most

important second crop by the farmers surveyed). With the change in the cereals regime, returns to durum wheat have also fallen. Hence a farmer choosing between cotton and the next best alternative (durum wheat) would continue to plant cotton. This is confirmed by the survey findings. For farmers citing durum wheat as their second most important crop, its area fell by 21% in Makedonia-Thraki in 2006. In Thessalia-Sterea Ellas, the durum wheat area fell by 4% among those surveyed (Table 3.30).

Table 3.29: Cotton Areas for Different Farmer Groups in Greece, 2006 vs. 2005

	Makedonia-Thraki	Thessali/Sterea Ellas	Thessali/Sterea Ellas
Farmers Receiving Ag.Environmental Payments	No	Yes	No
No: of Observations	85	49	58
Average Cotton Area 2006 (ha)	5.75	10.09	6.38
Average of Cotton Area 2005 (ha)	5.41	10.19	6.36
Average Yield 2006 (kg/ha)	2,708	3,715	3,135
Average Yield 2005 (kg/ha)	3,413	3,917	3,603
Change in Area 2006 v 2005	6%	-1%	0%
Change in yield 2006 v 2005	-21%	-5%	-13%

Source: Questionnaire.

Table 3.30: Change in Greek Durum Wheat Areas Where Durum Wheat was the Second Crop After Cotton (hectares)

	2005	2006	Change
Makedonia-Thraki	32.7	25.8	-21%
Thessalia Sterea/Ellas	43.2	41.4	-4%

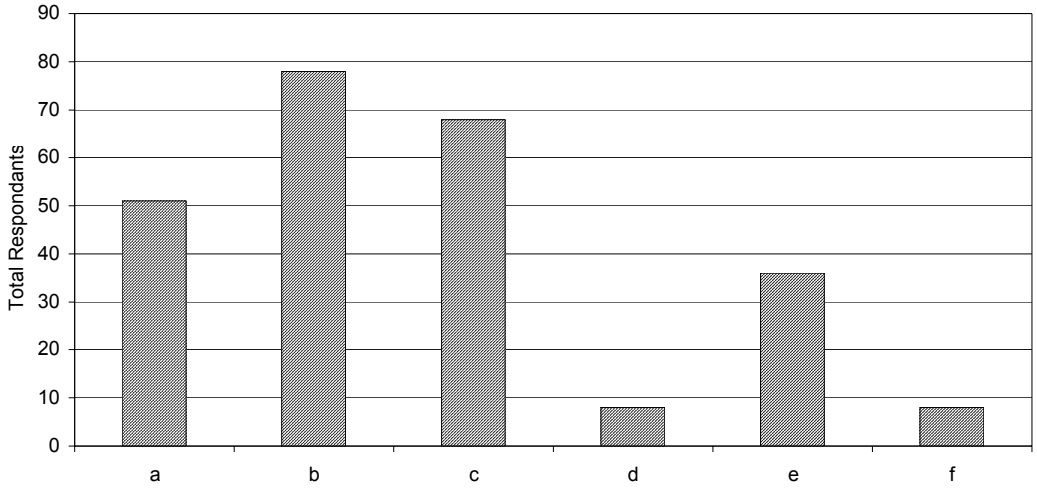
Source: Questionnaire.

That farmers did not plant maize instead of cotton, although the maize gross margin was higher than that on cotton without the agri-environmental payment is at first sight an unexpected outcome, but this can be attributed to a number of technical and economic factors in the short run:

- Maize requires more water than cotton and in areas of water deficit, such as Thessalia, it would be difficult to increase the maize area.
- Maize also requires the use of sprinkle irrigation, whereas many cotton farms use drip irrigation. The timing of irrigation use is also different for the two crops, with water required earlier in the year for maize than is the case for cotton.
- 2006 was also the first year following the reforms and many farmers appear to have been slow to adjust to the change in relative gross margins. However, the planted area in 2007 is expected to be only marginally lower than that of 2006.
- Underlying this response is a degree of inertia in the Greek industry. The size of farms is relatively small and it is expected to take longer to switch to alternative crops.

- Finally, when asked about the key influences behind the decision to plant cotton, most farmers in Makedonia-Thraki responded that the price paid by the ginner, the coupled payment and direct/decoupled payment were the most important.
- In Thessalia/Sterea Ellas, the agri-environmental payments were also important in the planting decision (Diagrams 3.18 and 3.19).
- The influence of the decoupled payment on planting decisions could suggest that the reform is not fully understood, or that farmers wish to maintain cotton in case further changes to the regime include 2006 in cotton base area calculations.

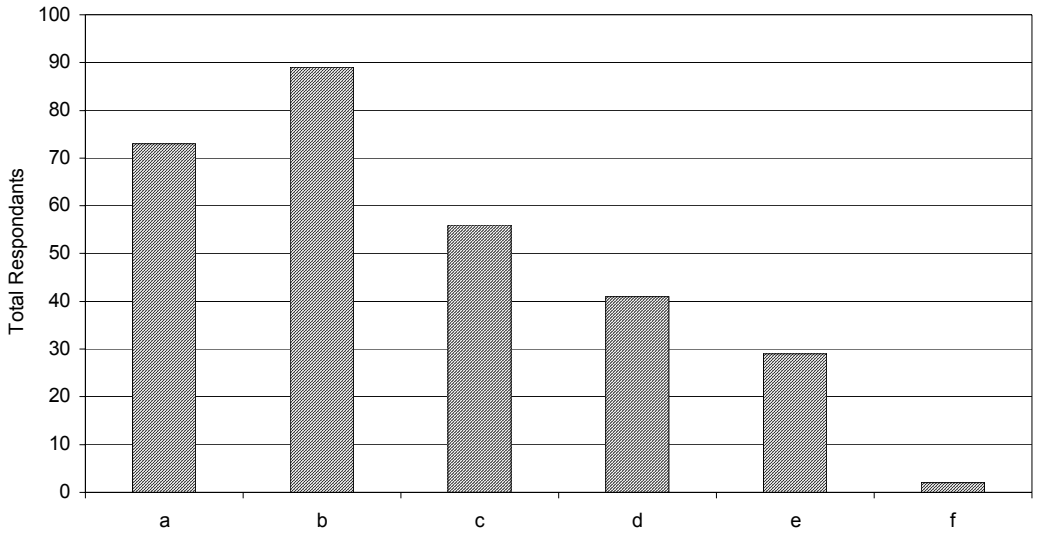
Diagram 3.18: Key Influences in the Planting Decision, Makedonia-Thraki



Where a = Price paid by the ginner, b = Cotton area payment, c = Direct payment, d = Agri-environmental payment, e = Price of other crops, f = Other

Source: Questionnaire

Diagram 3.19: Key Influences in the Planting Decision, Thessalia/Sterea Ellas



Where a = Price paid by the ginner, b = Cotton area payment, c = Direct payment, d = Agri-environmental payment, e = Price of other crops, f = Other

Source: Questionnaire

Spain

Following the implementation of the cotton reform in 2006, the returns to cotton farmers changed from a single payment from the ginners, including the Aid, to a payment from the ginner (based on the world price) plus a coupled cotton area payment, which is €1,039 per hectare. Some Spanish farmers also receive additional payments:

- First, a supplementary payment of €191 per hectare was available to Spanish cotton producers under Article 69 of the reform. This payment occurs because the government switched 10% of the decoupled payment to a coupled payment. To receive this payment, certain quality conditions apply (cotton with maximum impurity of 5%, maximum humidity of 12% and a yield higher than a local minimum); and,

- Second, under the integrated production system a further €350 per hectare were available. To receive this latter amount, certain agri-environmental norms had to be met, including a reduction in input use.

With these changes in sources of revenue, farmers face a number of cotton production options:

1. To maintain production using traditional production techniques with yields of around four tonnes per hectare. In this case, revenues would be €2,238 per hectare, since both the coupled payment and supplementary payment would be received (Table 3.30);

2. Reduce input use (and production costs) and claim the additional agri-environmental payment. In this case, direct revenues from the sale of cotton are lower (due to lower yields), but other payments, e.g., the integrated payment, were higher. In this instance, revenues are €2,206 per hectare (Table 3.30).

3. Reduce input use, but without claiming the agri-environmental payment. This could occur due to administrative difficulties in establishing the producer associations required to receive the integrated payment. Under this scenario revenues are €1,856 per hectare (Table 3.30).

4. Reduce inputs to a minimal level, a level just sufficient to receive the coupled payment. In this case, farmers only harvest the cotton if the revenue from cotton sales is sufficient to cover harvesting and transport costs. In this situation, revenues fall to €1,283 per hectare (Table 3.30).

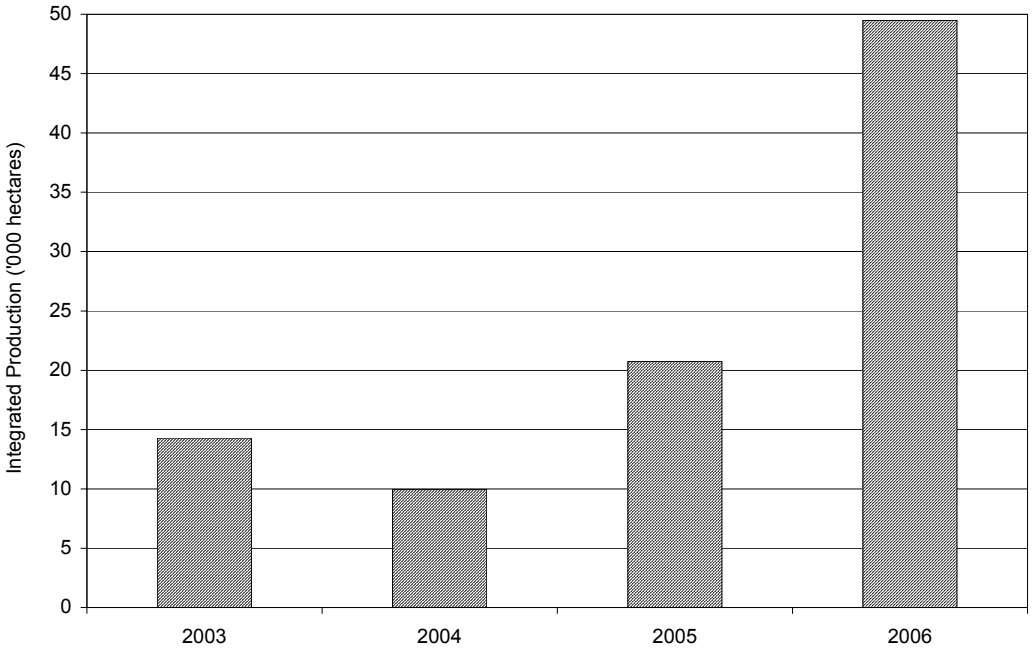
Farmers would only be eligible to the supplementary payment under options 1 to 3. Under option 4, the yield would be below the local minimum and growers would not receive the supplementary payment.

Faced with the four choices, gross margins are found to be highest for the second option, i.e., when yields are deliberately reduced and the agri-environmental payment is received. This is confirmed by observing farmer behaviour. In 2006, the area covered by the agri-environmental payment rose to close to 50,000 hectares. This is the most profitable measure because the actual reduction in costs has been greater than that assumed in the official calculation (Diagram 3.20).

The gross margin is similar for options 1 and 3, in both of which the supplementary payment is received. However, option 3, with the less intensive farming system, generates a higher return to unpaid labour. The gross margin for the low input-low output system, option 4, is the lowest amongst the four considered (Diagram 3.21).

The gross margins do not include the decoupled payment since these do not affect returns when producers make their crop choices at the margin.

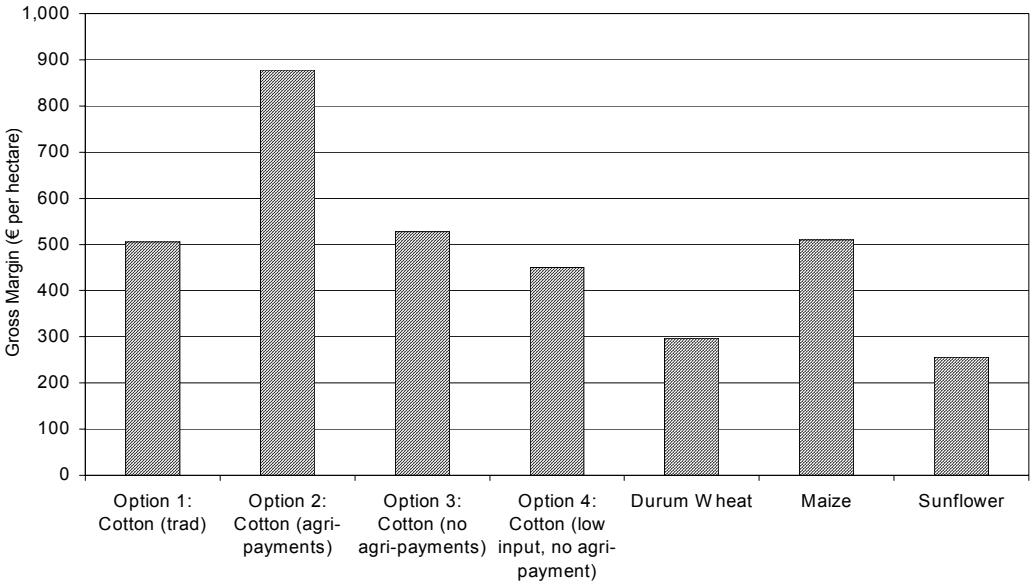
Diagram 3.20: Area Receiving Agri-environmental Payments, Spain



Source: National and regional government data

Maize has the highest gross margin of the alternative crops to cotton and its gross margin is similar to that earned on cotton under options 1 and 3. The returns per day from maize are higher than with these two options, which explains why, in Spain, there was a switch away from cotton in 2006.

Diagram 3.21: Gross Margin, Cotton vis-a-vis Competing Crops



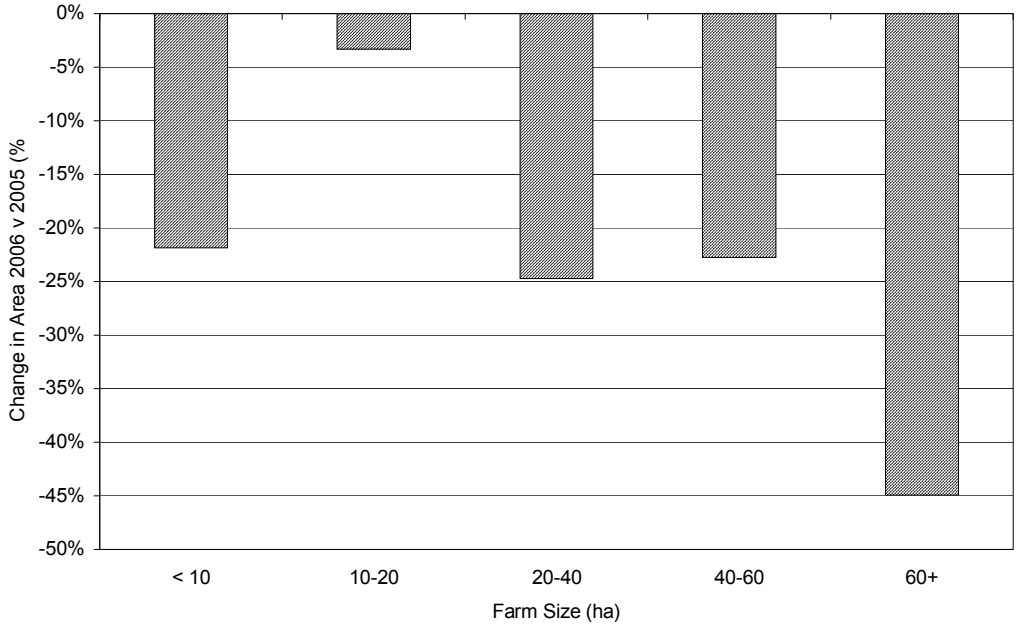
Source: LMC estimates

In 2006 Spain's cotton area fell. In analysing the fall, we can divide the area into two classes: those areas where farmers received the supplementary and agri-environmental payments; and, those that did not. In both cases, yields fell significantly. This suggests that where farmers did not receive the agri-environmental payment, they opted for option 3 rather than option 1.

In 2006, 49,478 hectares were covered by the integrated production payment (option 2), leaving 16,631 hectares not receiving the payment. In the latter group, a proportion was, reportedly, not harvested, i.e. option 4 was favoured over option 3. Our analysis of gross margins suggests that for farmers who did not receive the integrated production payment, but did receive the supplementary payment, gross margins were similar to those of maize and hence some farmers opted to switch production away from cotton.

The largest change in area was among the larger farmers (Diagram 3.22). This occurred partly because the incentives for the agri-environmental payment were less for the larger farms. Under the measure, the full €350 per hectare is only available for farms under 40 hectares, 60% of the measure is available for farms sized between 40 to 80 hectares. For farms over 80 hectares only 30% of the measure is available.

Diagram 3.22: Change in Cotton Area by Farm Size in Spain, 2006 vs. 2005



Source: Questionnaire and national sources

Table 3.31: Spain - Returns Following the Reform to the Cotton Regime (€ per hectare)

	Cotton (trad)	Cotton (agri-env payments)	Cotton (no agri-env payments)	Cotton (low input-low output)	Durum Wheat	Maize	Sunflower
Price per tonne (€/t)	244	244	244	244	139	129	233.0
Yield (t/ha, unginned)	4.1	2.6	2.6	1.0	3.4	12.3	2.2
Coupled Payment (€/ha)	1,039.0	1,039.0	1,039.0	1,039.0	59.9	115.0	59.9
Agri environmental (€/ha)		350.0					
Supplementary Payment (€/ha)	191.0	191.0	191.0				
Durum Wheat zone supplement (€/ha)	.				71.3		
Quality premium ((€/ha)					40.0		
Total Revenue	2,238	2,206	1,856	1,283	643	1,695	565
Variable Cost (excluding Family Labour)	1,733	1,328	1,328	833	346	1,185	317
Gross Margin	505	878	528	450	297	510	248
Unpaid Labour (hrs)	182	153	153	127	134	103	60
Return to unpaid labour	2.8	5.7	3.4	3.5	2.2	4.9	4.1

Note: Prices for the cereals are based on the average prices of the past three years. This is to reflect farmers' price expectations.

Costs for the low input-low output are based on the assumption that input costs fall by 75%, irrigation costs by 60%, and other costs by 50%, labour costs fall by 25% from the 2005 average

Source: LMC, Tables 3.21 to 3.24

According to responses to the survey, for farmers who planted cotton and received the integrated production payment, the area under cotton fell by 4% in 2006. For farmers who did not receive the payment in 2006, the cotton planted area fell by 43%. In each grouping there were also farmers who did not plant cotton. Table 3.32 summarises the responses of farmers surveyed. Farmers who received integrated production payment are shown as a "yes" in the first row and for those who did not, a "no" in the first row. The second row of the table indicates whether or not they planted cotton in 2006.

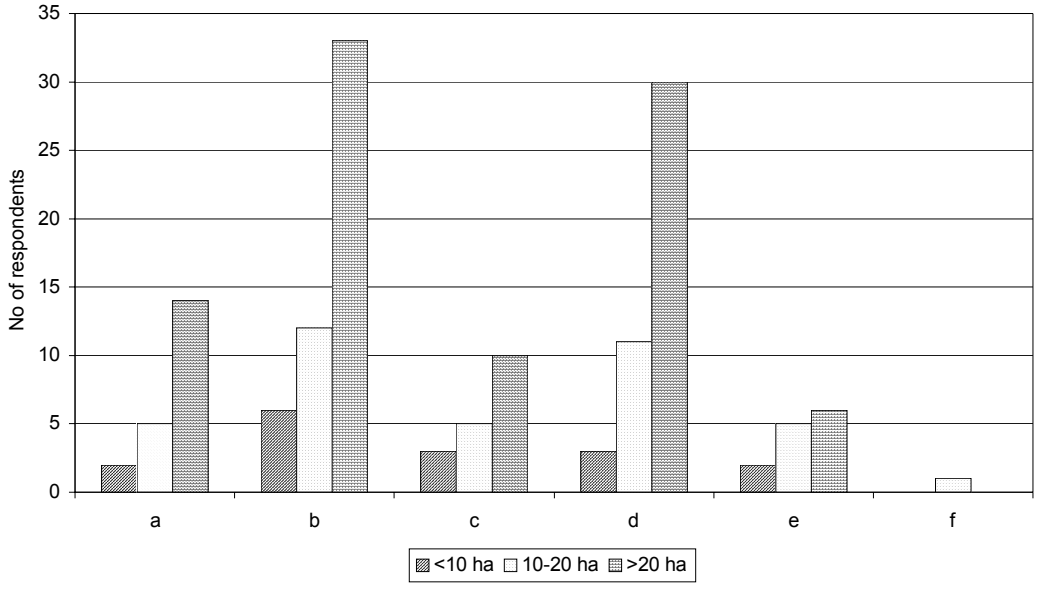
Table 3.32: Survey Results Regarding the Areas under Cotton for Farmers Receiving Additional Payments versus Farmers not Receiving Additional Payments

Farmers Receiving Additional Payments	Yes	Yes	No	No
Did Farmers Plant Cotton in 2006?	Yes	No	Yes	No
No: of Observations	40	3	8	4
Average Cotton Area 2006 (ha)	18.55		5.33	
Average of Cotton Area 2005 (ha)	19.24	18.00	9.29	21.58
Average Yield 2006 (kg/ha)	2,602		2,280	
Average Yield 2005 (kg/ha)	4,149	4,534	4,508	4,400
Change in Area 2006 vs. 2005	-4%		-43%	
Change in Yield 2006 vs. 2005	-37%		-49%	

Source: Questionnaire.

These reactions of farmers to the change in regime are consistent with their responses to other questions posed in the questionnaires. When asked what were the key influences behind the decision to plant cotton in 2006, the majority of farmers surveyed for the questionnaire responded that the coupled payment and the agri-environmental payment were the most important (Diagram 3.23).

Diagram 3.23: Key Influences in the Spanish Cotton Planting Decision in 2006



Where a = Price paid by the ginner, b = Cotton area payment, c = Direct payment, d = Agri-environmental payment, e = Price of other crops, f = Other

Source Questionnaire

A final question concerns the decision whether to harvest cotton or not, given that the coupled payment is paid on the boll opening rather than harvesting. We examine the responses of the policy change on four groups of farmers discussed above

1. Maintaining production using traditional production techniques with yields of around four tonnes per hectare.

2. Reducing input use (and production costs) and claiming the additional agri-environmental payment.

3. Reduce input use, but without claiming the agri-environmental payment.

4. Reduce inputs to a minimal level, a level just sufficient to receive the coupled payment.

Table 3.33 reveals the choices that are open to the farmer and compares the gross margins for harvesting cotton with those from not harvesting cotton. When farmers do not harvest cotton, revenues are reduced by the cotton sales price while costs are reduced by the cost of harvesting and transport to the gin (in the cases – the majority – where this cost in borne by the farmer). It is only under option 4, the low input-low output production system that it is beneficial not to harvest cotton.

For some producers in Spain, option 4 is the optimal production decision. This occurs when agri-environmental payments are not being received and returns per day are regarded as a better measure of profitability than the gross margin.

Table 3.33: Spain, The Decision Whether to Harvest Cotton or Not

	Cotton	Cotton (agri-environ payments)	Cotton (no agri-environ payments)	Cotton (low input-low output)
Agro-environment Payment	No	Yes	No	No
Supplementary Payment	Yes	Yes	Yes	No
Harvest Cotton				
Derived yield (Tonnes/ha)	4.13	2.56	2.56	1.00
Payments				
Agro-environment Payment (€/ha)	0	350	0	0
Additional Payment (€/ha)	191	191	191	0
Gross Margin (€/ha)	505	878	528	450
Not Harvest Cotton	.			
Revenue Forgone				
Sales Price (per tonne)	244	244	244	244
Sales Price (per hectare)	1008	626	626	244
Costs foregone				
Harvesting (per hectare)	255	255	255	255
Transport (per tonne)	20	20	20	20
Transport (per hectare)	83	51	51	20
Gross Margin (€/ha)	-165	558	208	481

Source: Derived from Table 3.23 and cost/revenue questions in the Questionnaire.

Chapter 4: The Economics of Ginning

In this chapter we consider the economics of ginning and the impact of the reform implemented in the cotton regime in 2006 on the ginning industry. The chapter covers the issues of capacity utilisation, production costs, the processing coefficient and the profitability of the ginning industry.

The data used are aggregate data obtained from several sources including:

- Industry associations;
- A questionnaire sent to ginners; and
- A database of company accounts (ICAP) that covered some 33 Greek gins.

THE ROLE OF THE GINNER

The ginner purchases unginned cotton from farmers and processes it into ginned cotton and cottonseed. Purchases are on an outright basis. There is no tolling of unginned cotton for farmers. Responses to the questionnaire revealed that purchases are made on a spot rather than forward basis. There are very few ginners who have contracts with individual growers. From the gins interviewed, 16% marketed all their cotton themselves, 33% used a marketer/trader, while 50% used both.

Over the past five years, the volume of sales to EU-15 member states has fallen as the European textile industry has steadily declined. Ginners in Greece and Spain have had to look increasingly outside the Community for markets. Over the last five years, exports accounted for 72% of production in Greece and 45% of production in Spain.

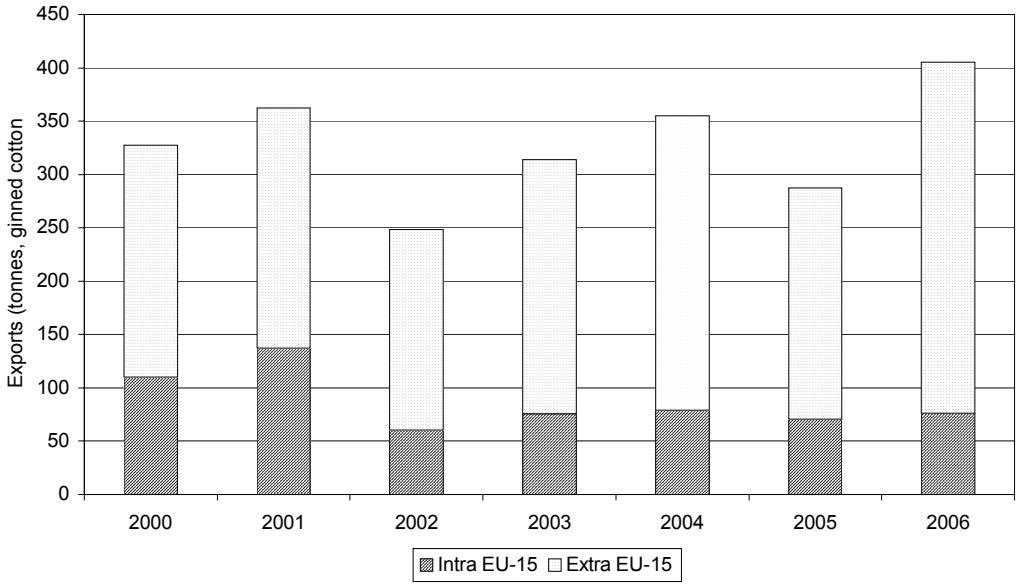
Greek exports are dominated by exports to Turkey and North Africa. In Spain, EU-15 exports were the most important until 2006 (Table 4.1).

Table 4.1: EU Cotton Exports (tonnes, ginned cotton)

	2000	2001	2002	2003	2004	2005	2006
Greece							
Intra EU-15	86,599	116,235	47,457	58,869	43,800	39,400	45,629
Extra EU-15	203,353	210,100	179,018	225,354	243,639	192,960	286,762
Turkey	134,286	130,444	109,511	99,786	129,161	90,725	164,263
North Africa	17,664	12,571	11,345	18,388	47,473	47,070	55,895
Central Europe	32,003	33,458	27,751	26,741	23,508	14,700	23,111
Other	19,402	33,627	30,412	80,440	43,496	40,466	43,493
Total	**289,952**	**326,335**	**226,474**	**284,224**	**287,439**	**232,361**	**332,391**
Spain							
Intra EU-15	23,244	20,770	12,830	16,988	35,203	30,970	30,450
Extra EU-15	14,412	15,467	9,131	12,675	32,228	23,913	42,501
North Africa	10,238	11,019	8,291	5,603	12,085	8,691	16,168
ASEAN	1,972	509	348	119	1,279	1,572	8,605
Other	2,201	3,939	492	6,953	18,864	13,650	17,729
Total	**37,656**	**36,237**	**21,961**	**29,662**	**67,431**	**54,883**	**72,952**

Source: Eurostat.

Diagram 4.1: EU-15 Cotton Ginned Exports

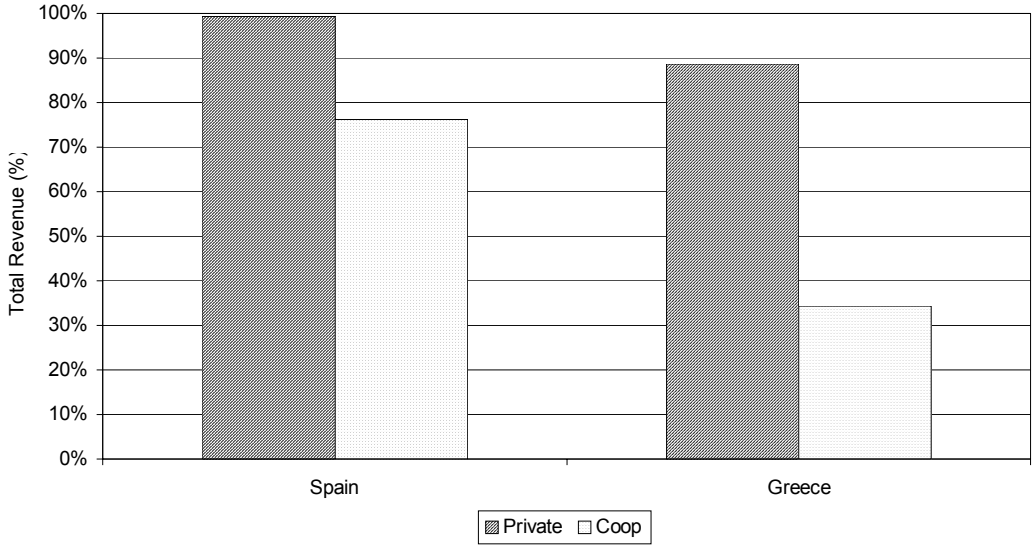


Source: Eurostat

All but one of the Greek gins interviewed belonged to an inter-branch organisation. These were thought to be useful for solving problems in the sector and for improving quality. All ginners purchased cotton only from other members of the inter-branch organisation. The Spanish experience of inter-branch organisations is more mixed.

Among the companies interviewed, ginning activities accounted for 82% of total revenues in Greece and 87% of revenues in Spain. Cooperative ginning operations also have interests in input distribution and the contracting of services; hence their revenues from ginning alone was lower (Diagram 4.2). In Greece, within the cotton-related activities, a number of companies also crushed cottonseed into oil and cake. Non-cotton activities were linked to the warehousing and storage of other commodities.

Diagram 4.2: Sources of Revenues from Ginning Activities



Source: Questionnaires

CAPACITY AND CAPACITY UTILISATION

Spain

Out of a total of 29 ginning mills, 27 were active in Spain in 2005/06 prior to the reforms, of which 85% were located in Andalucia (mainly in Seville Province) with the remainder located in Cartagena Province, in Murcia (Table 4.2).

Table 4.2: Spain – Location of Active Ginning Mills, 2005/06

Community	Province	No. of mills	% of total
Andalucia	Seville	15	56%
	Cordoba	5	19%
	Cadiz	2	7%
	Jaen	1	4%
Murcia	Cartagena	4	15%
Total		**27**	**100%**

Source: Spanish Ginning Industry Paper

Following the reform, in 2006, six of these gins did not open and one was closed permanently. Of those that opened, many worked only one or two shifts per day, of eight hours per shift.

Capacity levels are difficult to calculate since each factory works for a different number of days and for a different number of hours per day. From the questionnaires, the gins surveyed varied in the number of days operated from 50 to 75 during 2005; the average was 58 days. The number of hours for which each gin operated each day varied between 16 and 24. On the basis of the gins' own data, this resulted in an average capacity utilisation level of 72% in 2005. In 2006, capacity utilisation among the gins we surveyed fell to just 20% and two gins were closed. The gins that were closed were part of ginning groups operating two or more gins.

In 2004, total employment in the Andalucia cotton-ginning sector was over 1,170 workers, comprising over 250 permanent workers and 920 seasonal workers (equivalent to 11 permanent workers and 40 seasonal workers per mill on average). The provincial distribution of employment reflects the distribution of mills by province (Table 4.3).

Table 4.3: Employment by Cotton-Ginning Sector in Andalucia, 2004

Province	Permanent Workers	Seasonal Workers	Total	% of total
Seville	173	532	705	60%
Cordoba	52	283	335	29%
Cadiz	19	73	92	8%
Jaen	7	32	39	3%
Total	**251**	**920**	**1,171**	**100%**
Average no. of workers per mill	11	40		

Source: Diagnostico del Sector Algodonero Andaluz.

Greece

The high cotton prices seen during the period of 1995-1999 stimulated Turkey to expand its textile production, and in turn, Greece expanded its cotton production for exports to Turkey. By 2000, Greek ginners expanded processing capacity to meet the demand for more cotton. 73 ginning mills were active in Greece in 2005/06, of which one third were located in Makedonia, with the remainder mainly located in Thessalia, Central Greece (Sterea – Levadia) and Thrace (Table 4.4). Of the gins in operation, eight are co-operatives, the rest are operated by the private sector.

The Greek ginning sector is undergoing consolidation with two companies, Karagiorgos Bros. SA and Hellenic Fabrics/Accas Group (the owner of Thrace and Thessalia Ginning Mills) expected to account for around 30% of total cotton production by 2006/07. These two companies rented a number of poor-performing gins in 2006/07 to reduce transportation costs.

Table 4.4: Greece – Location of Active Ginning Mills, 2005/06

	No. of mills	% of total
Macedonia	24	33%
Thessalia	21	29%
Sterea (Levadia area)	20	27%
Thrace	7	10%
Epiros	1	1%
Total	**73**	**100%**

Source: HECOT.

As with Spain, capacity utilisation levels are difficult to calculate as each factory works for a different number of days and different number of hours. From the questionnaires, the gins surveyed from 26 to 110 in the number of days operated during 2005; the average was 75 days. The number of hours for which each gin operated each day varied between 8 and 24. If we take the gins' own data of daily processing capacity and multiply it by the number of days worked during 2005 and assume that this is total capacity, then the average capacity utilisation level was 61% in 2005. This over-estimates capacity to the extent that it assumes plants could run for 24 hours a day. In 2006, with lower production, capacity utilisation levels fell among the gins. Using the same approach, capacity utilisation for the companies surveyed fell to 43%.

However, the calculation is not as simple as that. Following the change in regime there were no longer any restrictions on the number of days per season for which a gin could operate. Previously, gins were obliged to operate during a specific time period. This was because the Aid was paid to the ginner, and it was felt that by restricting the operation period, inspections could be carried out more easily. Without this restriction, in 2006 the mills were free to operate for a longer number of days. The gins took advantage of this and increased the number of days worked, but reduced the number of hours worked each day. This reduced the need for nightshifts and overtime, thus reducing wage costs.

On average, the number of days worked increased to 81, while the number of hours worked per day fell to 13. In total, the number of hours worked by the plants over the whole season fell by 16% (Table 4.5).

Table 4.5: Number of Ginning Days and Hours Worked in Greece, 2004-2006

	Days worked		Hours per day	
	Average	Total	Average	Total
2004	73.3	2,493	14.8	459
2005	75.2	2,631	15.5	497
2006	80.5	2,818	12.6	389

Source: Questionnaire.

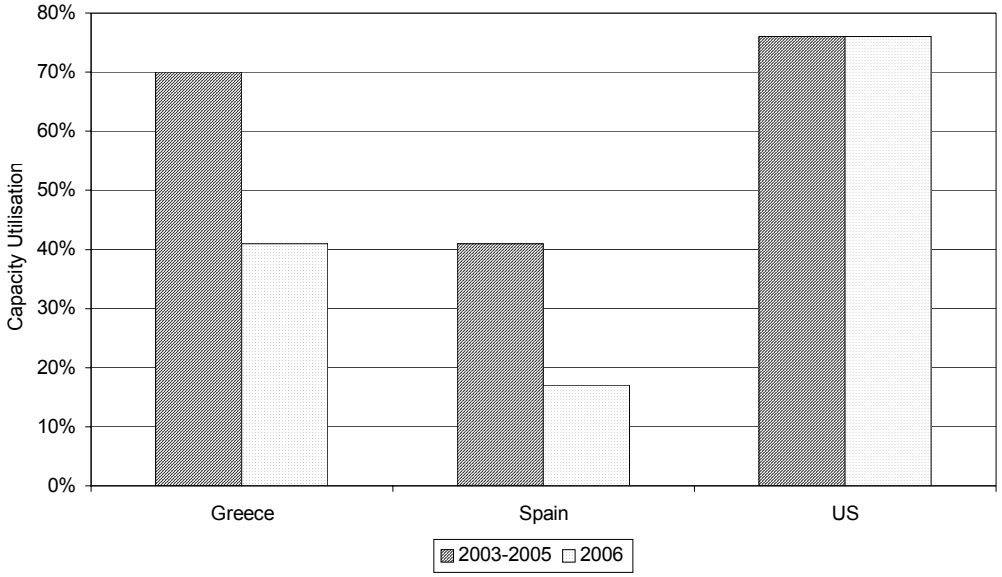
The average Greek ginning mill employs 10 permanent and 30 seasonal workers; this suggests that total employment in the Greek ginning sector is around 3,200 workers.

Benchmarking

On an industry-wide basis, to derive an objective measure of capacity, we have calculated capacity on the basis of US industry parameters. In the US there is, on average, an 81 day season based on two shifts (average operating time was 17.5 hours). We have recomputed the EU daily capacity numbers using data from ginning companies, adjusted to allow for two shifts. Where we have no capacity data (5 companies out of 27 in Spain and 10 out of 50 in Greece), we have estimated capacity as the average capacity of the companies from which we have data. This puts total ginning capacity at 0.86 million tonnes of unginned cotton in Spain and 1.60 million tonnes of unginned cotton in Greece.

On this basis, the capacity utilisation level for the whole industry in Greece is estimated to have averaged 70% in 2003-05 and to have fallen to 56% in 2006, while in Spain capacity utilisation is estimated to have been 41% in 2003-2005, falling to 17% in 2006. In the US capacity utilisation is estimated around 75% (Diagram 4.3).

Diagram 4.3: Average US and EU Gin Capacity Utilisation, 2003-2005 vs. 2006



Source: Industry Interviews, LMC estimates

This suggests that even pre-reform, there was overcapacity in the ginning industry. There are a number of reasons that led to this overcapacity:

- Ginning was profitable which encouraged its expansion. Profit as a proportion of revenue averaged 14% in Greece and 19% in Spain in 2004 and 2005.

- Ginning unit costs were high by international standards, partly as a result of over capacity. High costs were absorbed via the cotton regime, for two reasons:

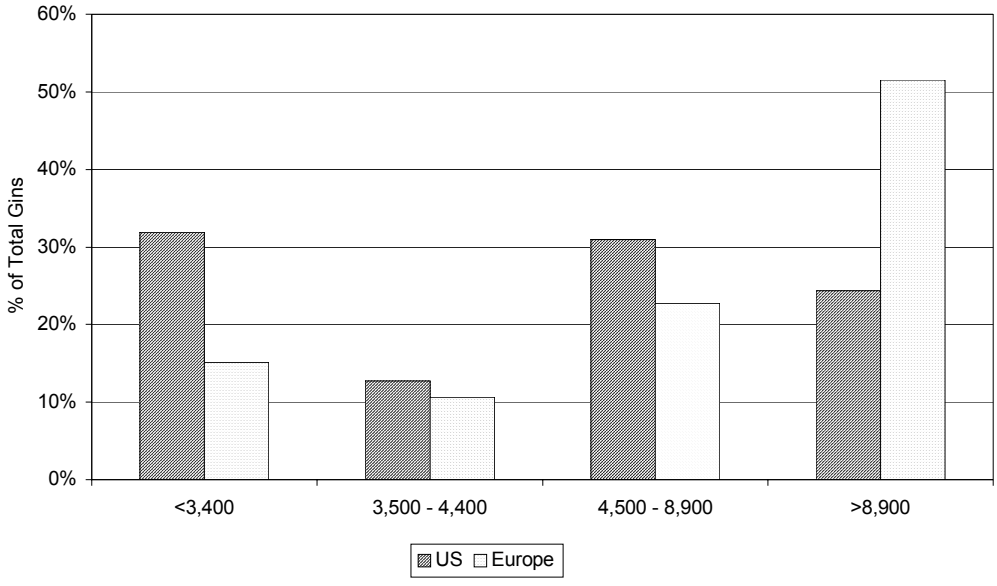
  — The unginned cotton price (which determined the payment of aid) was set at a level between 20.6% and 24.4% of the international price for ginned cotton[1]. For the ginner, this yielded a margin that equalled the difference between the sales price for ginned cotton and the calculated unginned cotton price. This margin had little relationship to an estimate of efficient ginning production costs.

  — The administrative element of the Aid was greater than the cost of administering the scheme; hence, this component provided an implicit subsidy to the ginners.

- In Greece, the high cotton prices seen during the period of 1995-1999 stimulated Turkey to expand its textile production, and in turn, Greece expanded its cotton production for exports to Turkey. By 2000, Greek ginners had expanded processing capacity to meet the demand for more cotton. Production however, did not increase further.

The average gin capacity in the EU is much larger than in the US (Diagram 4.4). In the EU, about half of the gins have over 9,000 tonnes of annual capacity, with several rated at 22,000 tonnes. By contrast, only 25% of US gins are rated at over 9,000 tonnes of ginned cotton, and very few of these have 22,000 tonnes capacity.

Diagram 4.4: Comparison of US and EU Gin Capacity by Size of Gin



Source: Industry Interviews, USDA, LMC estimates

[1] The actual amount varied according to the underlying world price.

GINNING PRODUCTION COSTS

From the questionnaires we are able to gain an impression of ginning costs and how these have changed.

Greece

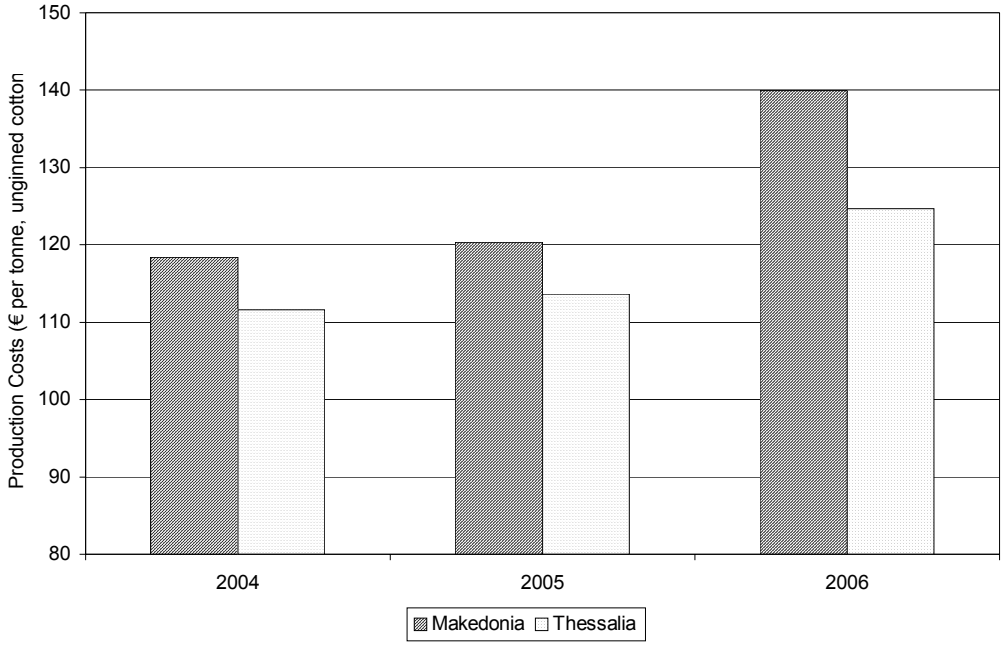
From the questionnaire respondents, Greek ginning costs averaged €118 per tonne of unginned cotton in 2004 and 2005 and rose to €135 per tonne in 2006. Fixed costs accounted for 37% of total costs, rising to 39% in 2006 (Table 4.6). Costs are higher in Makedonia than in Thessalia (Diagram 4.5).

Table 4.6: Average Greek Ginning Costs, 2004-2006 (€ per tonne, unginned cotton)

	Ginning	Storage	Sales/Marketing/Transport	Fixed Costs	Other	Total Costs
2004	44	8	9	44	13	117
2005	45	9	9	43	12	119
2006	50	10	10	53	12	135

Source: Questionnaire.

Diagram 4.5: Ginning Costs, Makedonia versus Thessalia



Source: Questionnaire and LMC estimates

With the fall in capacity utilisation, variable costs rose by 9% between 2005 and 2006, while fixed costs rose by 23%. The rise in costs would have been greater but for ginners' efforts to reduce costs, such as changing shift patterns. With shorter shifts, the level of unskilled labour employed in the gins fell by 15% in 2006. Skilled labour employment was unchanged (Table 4.7).

Table 4.7: Gin Employment Levels Among Greek Questionnaire Respondents (persons)

	Total Employment	Skilled (ginning)	Skilled year round	Unskilled
2004	94	26	20	49
2005	90	24	19	47
2006	82	23	19	40

Source: Questionnaire.

Spain

In Spain, there was a wide range of reported costs, and the size of the ginning operation does not seem to have influenced the costs significantly. Among the questionnaire respondents, ginning costs averaged €100 per tonne of unginned cotton in 2004 and 2005 and rose to €149 per tonne in 2006.

Fixed costs accounted for 50% of total costs rising to 55% in 2006 with the lower level of capacity utilisation (Table 4.8).

Table 4.8: Average Spanish Ginning Costs, 2004-2006 (€ per tonne, unginned cotton)

	2004	2005	2006
Total Cost	99	102	149
Variable	49	54	67
Fixed	50	49	82
Fixed % of Total	50%	47%	55%

Source: Questionnaire.

With the fall in capacity utilisation, variable costs rose by 24% between 2005 and 2006, while fixed costs rose by 69%. In order to reduce costs (both fixed and variable), the levels of employment fell significantly in 2006. Casual workers and skilled staff linked directly to the ginning operation were the major losers. Permanent staff were largely unaffected as ginners sought to continue their operations and continue to provide a range of services (Table 4.9). Discussions with ginners suggest that this trend will continue in 2007, but that by 2008 the number of permanent staff, too, will begin to decline if capacity utilisation levels do not rise.

Of concern to gins is that some producers planted cotton but did not harvest it (option 4 as described in Chapter 3). This increases uncertainty in the sector.

Table 4.9: Gin Employment Levels Among Spanish Questionnaire Respondents (persons)

	Total Employment	Skilled (ginning)	Skilled year round	Unskilled
2004	276	155	71	89
2005	270	142	71	82
2006	216	95	74	47

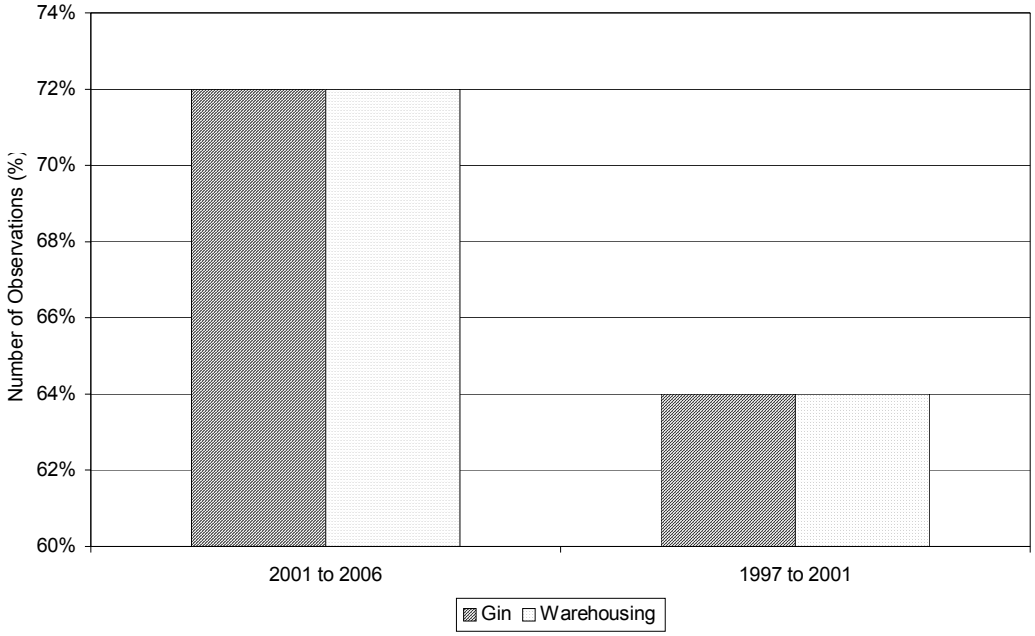
Source: Questionnaire.

INVESTMENT

Capital investment in the gins is lumpy and varies considerably between years. When asked how investment in the ginning operation and warehousing had changed over the last five years, in Greece 72% of the respondents reported that investment had increased over the last five years. This increase was largely in increasing the capacity of ginning operations and improving ginning machinery to increase the quality of production.

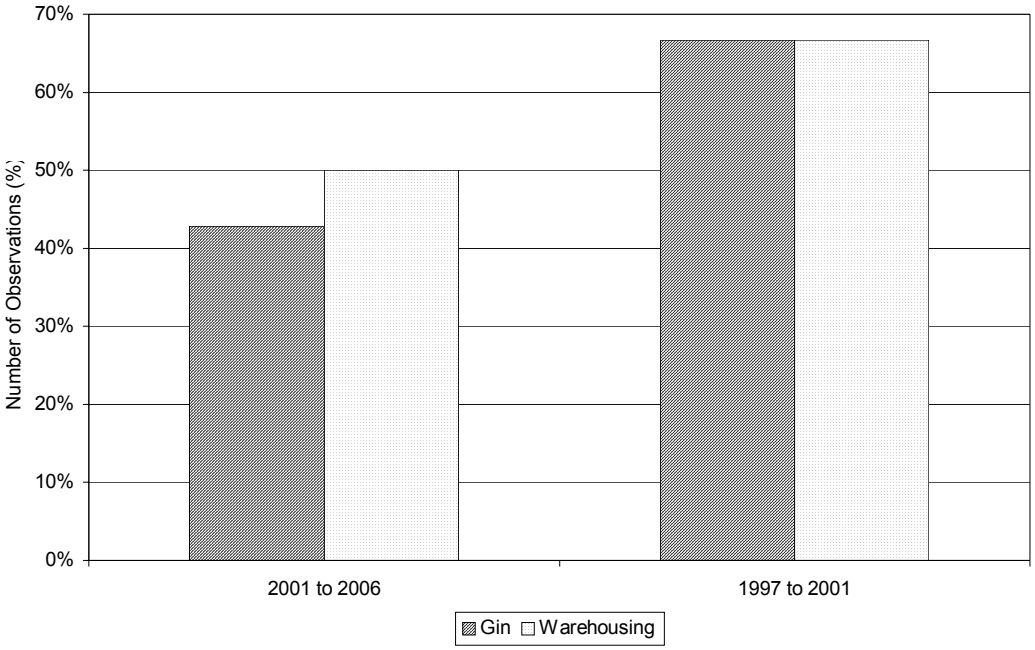
In Spain, fewer than 50% of the respondents reported an increase in investment. In the rest of cases, investment was unchanged from previous years. Investment in warehousing capacity was also greater in Greece than Spain (Diagrams 4.6 and 4.7).

Diagram 4.6: Proportion of Greek Gins Reporting an Increase in Investment in 1997-2001 and in 2001-2006



Source: Questionnaire and LMC estimates

Diagram 4.7: Proportion of Spanish Gins Reporting an Increase in Investment in 1997-2001 and in 2001-2006



Source: Questionnaire and LMC estimates

COTTON FIBRE QUALITY

The quality of cotton fibre is determined by a combination of factors, including

- The variety of cotton;
- Agronomic inputs such as fertiliser and irrigation;
- Weather factors such as rain at the time of harvest;
- Harvest practices such as use of defoliants and use of stripper versus picker machines; and
- Ginning practices such as drying temperature and speed of processing

These various forces affect fibre characteristics, e.g., strength, micronaire (a measure of maturity), fibre length (also called staple length), leaf (a measure of the amount of impurities entrapped among the fibres) and colour (ranging from white to spotted or yellow stained). These quality traits are the basis on which the price of ginned cotton is determined, and on which textile manufacturers decide to purchase particular lots of cotton.

Until the 2006/07 season, Greek and Spanish cotton was considered to have good quality characteristics, with staple (fibre) length of over 28 mm and colour generally below 41 (Table 4.10). Furthermore, in Greece, fibre quality has been improving because of greater penetration of the FiberMax varieties, which have longer fibre and smaller seed. FiberMax varieties now account for about 40% of cotton production.

Following the reform, the quality of ginned cotton from the 2006 crop deteriorated compared to previous years in both Greece and Spain. Some diminution of quality was

a result of weather in Greece, but the greatest impact came as a result of poorer farm management. This is perceived by ginners to be the result of the requirement that the coupled payment is made on boll opening rather than harvest. Lower fertiliser and irrigation use in Spain resulted in shorter fibre length. In addition, farmers did not defoliate (the application of a chemical to cause the leaves to fall off) before harvesting, which increased the amount of leaf impurities in the unginned cotton.

In Greece, the fibre length, fibre strength and colour were reported to be of worse quality in 2006, than they had been five years earlier.

Table 4.10: Reported Greek Cotton Quality, 2006 versus 2001-2005 (Modal Response)

	Fibre length	Fibre strength,	Micronaire	Colour
Past Five Years	28.50	29.00	4.05	41
2006	27.50	27.50	4.15	51

Source: Questionnaire.

In Spain, Individual quality characteristics were reported by two ginners (Table 4.11). In these cases, the fibre length, fibre strength and micronaire were all said to be of a lower quality in 2006 than it had been in 2005.

Table 4.11: Reported Spanish Cotton Quality, 2006 versus 2005

	fibre length	fibre strength,	micronaire	Colour
2005	28-28.7	30-30.5	3.7-4.4	Strict middling - middling
2006	27-28.5	28.9	2.9-4.2	Middling -- barely middling

Source: Questionnaire.

Another factor that has acted to reduce the quality of both Greek and Spanish cotton, but which is not related to the new regime, is the increasing use of stripper harvesters. The type of cotton varieties grown in both countries is the picker type, with more open bolls, that allows a spindle harvester to be used. The spindle harvester is gentler than stripper harvesters in handling the plant and the bolls, so that few impurities are incorporated into the unginned cotton. However, spindle harvesters are slow and very expensive, and are being replaced by stripper harvesters, which are faster and more affordable, but, because they literally beat the entire plant in the process of harvesting, far more plant matter – sticks, leaves, etc. - are brought into the gin along with the unginned cotton.

The reduced quality of Greek and Spanish cotton has affected the potential export market for ginned cotton. Textile factories in Turkey, which has become the key trading partner for Greece's cotton, need relatively low grade cotton. Therefore, the lower quality of the 2006 cotton is believed to have had only slight impact on Greek exports to its neighbour. However, it has affected trade with the Far East, which requires higher qualities. Spain's trade with the Far East is reported to have fallen sharply in 2007, and it substituted that amount with trade to Turkey, with whom Spain does not traditionally trade large volumes of cotton.

PROFITABILITY

To calculate the profitability of the ginning industry, first we calculate the revenues of the gins. These are from the sale of ginned cotton and cottonseed and, under the old regime, the fee for administering the Aid programme. Then we compute the costs, both the purchase price for unginned cotton and the costs of operating the ginning process.

The average sales revenue from ginned cotton fell slightly in 2006 in Greece, but rose in Spain. From the Greek gins surveyed, the average sales price was €955 per tonne in 2006 and the sales price for cottonseed was €138 per tonne. In Spain, the average sales price was €925 per tonne, while all cottonseed was sold in seed form to the local livestock industry at an average price of €169 per tonne.

The costs to the ginner are broken down between the costs of purchasing unginned cotton and the costs of the ginning process. There is a strong disparity between Greece and Spain in the prices paid to farmers for unginned cotton in 2006, as well as a significant shift in markets for ginned cotton.

- Greek ginners paid an average of €314 per tonne for unginned cotton, up from €299 in 2005, while Spanish ginners €283 per tonne, up from €242.
- The higher price paid in Greece was due in part to ginners having to compete unginned cotton away from other gins.
- In addition, Greek ginners paid for the transport to the gin in many cases and this was included in the grower price. In Spain, the ginners did not pay the transport in most cases. The gins paid the transport prior to the change in regime.

Prior to 2006, the price of unginned cotton included the Aid; hence when it is included in the grower price calculation (as is the case in Spain), to determine the costs to the gin we have removed the Aid. The fee to the ginners for administering the previous Aid scheme was €53.1 per tonne of unginned cotton, or €160.31 per tonne of ginned cotton. (In the Greek questionnaire, ginners stated that the payment they actually received for administering the scheme was €18 per tonne of unginned cotton.)

The gross margin is derived as the difference between revenues (including the full administration fee of €53.1 per tonne of unginned cotton) and the unginned cotton purchase price. In calculating the change in the gross margin between 2005 and 2006, an adjustment has been made for transport costs in Spain, where we have assumed that this cost is now borne by the farmer. For Spain, we calculate the gross margin net of transport costs, assuming that they are borne by growers following the reform.

Greece

The analysis suggests that the gross margin fell to €234 per tonne in 2006 as the gins stopped receiving aid to administer the cotton regime and because the unginned cotton price rose as gin were forced to compete for the limited cotton available (the unginned cotton price as a proportion of the sales price rose to 33% in 2006 from 30% in 2005) (Table 4.12).

Deducting ginning costs from the gross margin allows us to calculate profitability. Following the reform, gins were in a position where they were unable to cover their fixed costs; hence their profitability became negative (Table 4.12 and Diagram 4.8).

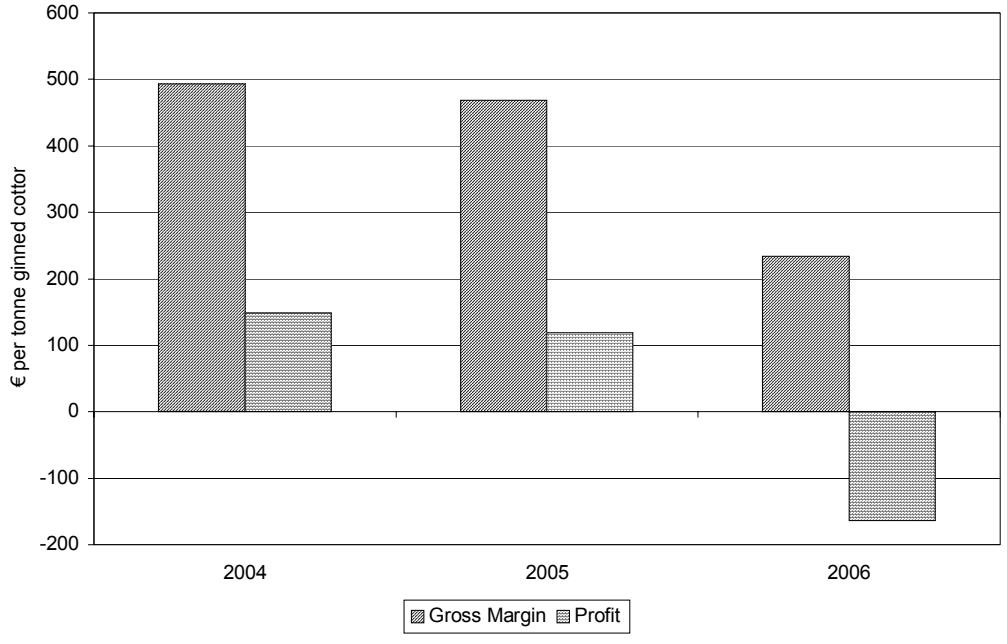
Table 4.12: Greek Ginning Industry Profitability, 2004-2006 (€ per tonne, unginned cotton, unless otherwise stated)

	2004	2005	2006
Revenue			
Ginned cotton	944.94	1,010.49	955.68
Cotton seed price	105.08	118.16	137.88
Ratio cotton seed to ginned cotton	148%	150%	146%
Cotton seed revenue	155.20	177.27	200.83
Aid to cover administration (€ per tonne ginned cotton)	160.31	160.31	.
Revenue	1,260.45	1,348.07	1,156.51
Costs			
Unginned Cotton Purchase (€ per tonne, unginned cotton)	260.98	298.93	313.73
Aid (€ per tonne, unginned cotton)	.	.	.
Net Cost of Unginned Cotton Purchase to Ginner	260.98	298.93	313.73
Processing coefficient	34%	34%	34%
Net Cost of Unginned Cotton (€ per tonne ginned cotton)	767.58	879.22	922.74
Gross Margin	492.87	468.85	233.78
Production Cost (€ per tonne, ginned cotton)	344.10	349.82	397.88
Profit	148.77	119.03	-164.11

Note: The unginned purchase price quoted by the ginners in the questionnaires did not include the Aid.

Source: LMC.

Diagram 4.8: Gross Margins and Profitability for Ginners in Greece, 2004-2006

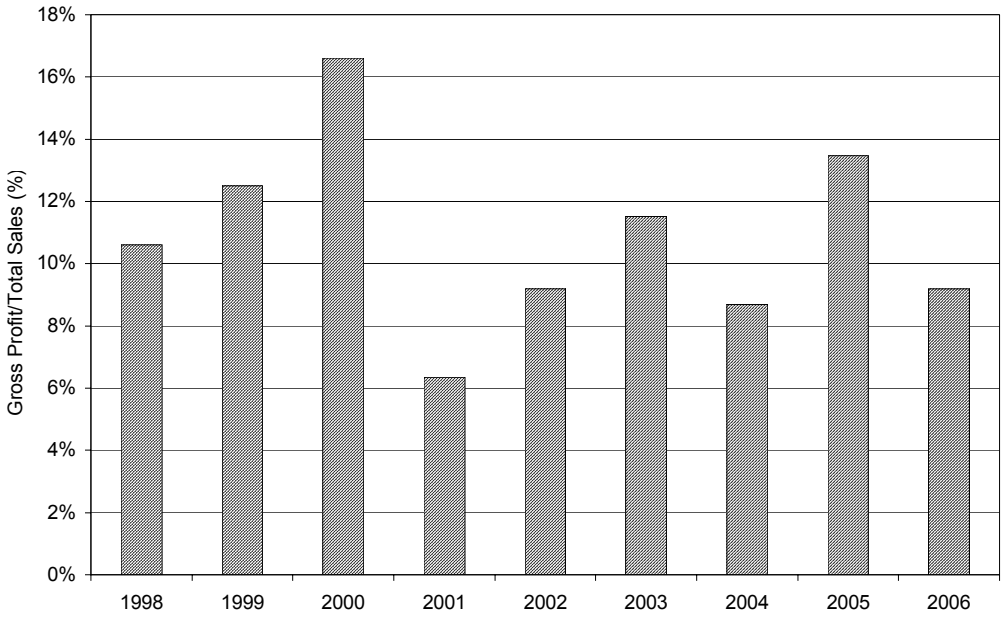


Source: Table 4.12

These findings regarding the profitability of the ginning industry are confirmed by the ICAP database for the earlier years (data are not yet available for the first year of the reform). The database contains the financial results of 33 ginning enterprises. Across

these gins the average level of profitability (measured as gross profit divided by total sales) averaged 9% in 2005/06, falling from 13% in 2004/05 (Diagram 4.9).

Diagram 4.9: Annual Average Reported Profitability of Greek Ginning Companies, 1997/98-2005/06



Source: ICAP company database

Spain

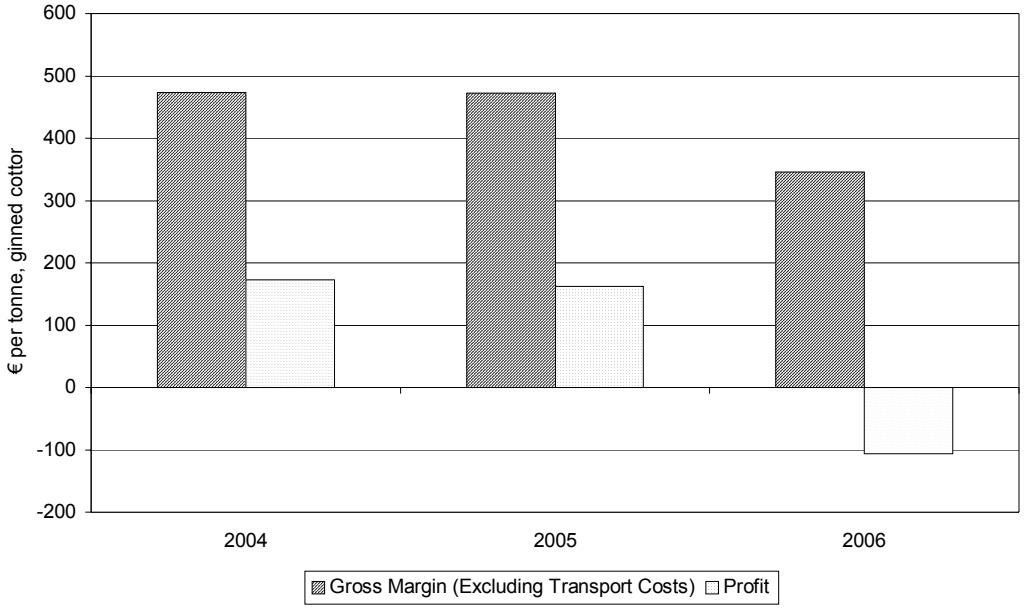
Our analysis implies that the gross margin for Spanish ginners has fallen from €473 per tonne in 2005 to €346 in 2006, a fall of 27% (Table 4.13). This fall in the gross margin is in line with AEDA data, which suggest that its members' gross margins fell by 22% in 2006. Deducting ginning costs from the gross margin, we deduce that after the reform, gins could not cover their fixed costs and made losses (Table 4.13 and Diagram 4.10).

Table 4.13: Spanish Ginning Industry Profitability, 2004-2006 (€ per tonne, unginned cotton, unless otherwise stated)

	2004	2005	2006
Revenue			
Ginned cotton	819.84	863.10	925.37
Cotton seed price	147.32	149.08	168.51
Ratio cotton seed to ginned cotton	164%	160%	164%
Cotton seed revenue	240.93	239.00	276.64
Aid to cover administration (€ per tonne ginned cotton)	160.31	160.31	.
Revenue	1,221.08	1,262.41	1,202.01
Costs			
Unginned Cotton Purchase (€ per tonne, unginned cotton)	835.17	863.10	282.56
Aid (€ per tonne, unginned cotton)	607.00	621.00	.
Net Cost of Unginned Cotton Purchase to Ginner	228.17	242.10	282.56
Processing coefficient	33%	33%	33%
Net Cost of Unginned Cotton (€ per tonne ginned cotton)	691.41	733.64	856.25
Gross Margin	529.67	528.77	345.76
Transport (€ per tonne, ginned cotton)	56.06	56.06	.
Gross Margin (Excluding Transport Costs)	473.60	472.71	345.76
Production Cost (€ per tonne, ginned cotton)	300.49	310.41	451.73
Profit	173.11	162.31	-105.97

Source: LMC.

Diagram 4.10: Gross Margins and Profitability for Ginners in Spain



Source: Table 2.5

TURNOVER

Turnover for the industry has been estimated by applying export unit values (for both ginned cotton and cottonseed) to the volumes produced by the industry. In the five years prior to the reforms, the turnover of the Greek ginning industry averaged €479 million per annum, while the Spanish industry averaged €155 million per annum.

In 2006, these sums fell to €412 million and €62 million, respectively (Table 4.14).

Table 4.14: Estimated EU Cotton Industry Turnover, 2000-2006

	Ginned Cotton Export Unit Value €/tonne	Volume '000 tonnes	Cotton Seed Export Unit Value €/tonne	Volume '000 tonnes	Turnover € million
Greece					
2000	1,128	443	129	636	582
2001	862	456	150	623	486
2002	964	373	196	586	475
2003	1,164	333	199	503	488
2004	1,024	392	213	569	523
2005	900	370	161	562	423
2006	1,000	314	218	450	412
Average 2001-2005					479
Spain					
2000	1,016	99	198	150	131
2001	1,204	111	219	168	170
2002	931	103	260	161	138
2003	1,071	100	211	153	139
2004	1,129	120	224	184	177
2005	926	116	242	178	151
2006	1,000	47	218	71	62
Average 2001-2005					155

Source: Eurostat, LMC.

Chapter 5: The Impact of Different Policy Scenarios on Cotton Production

In analysing the effects of changing the Cotton Regime, we consider Spain and Greece separately, as the impact of the changes has differed between these two countries.

Three scenarios are considered:

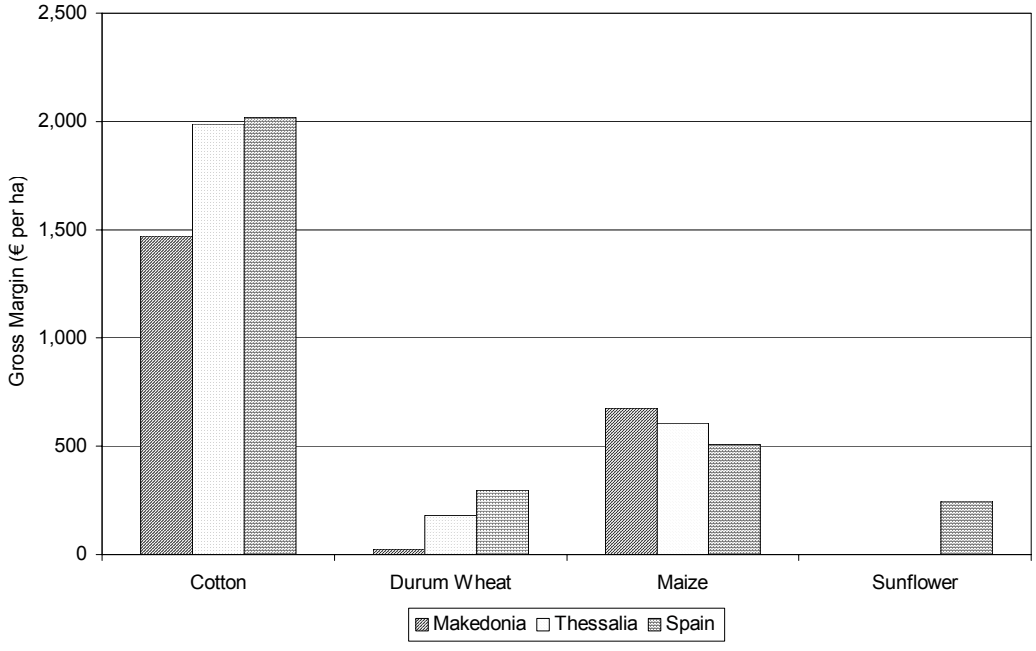
- The deficiency payment system;
- The 2004 reform scenario, including the effect of varying the share of decoupling; and
- Full decoupling.

THE DEFICIENCY PAYMENT SYSTEM

This refers to a system where aid is paid per tonne of unginned cotton. This is the same as the measures in effect prior to the reform. To analyse the outcome of this system, we examine the gross margins that existed prior to the reform for cotton with those of the main competing crops.

Under this pre-reform system, the gross margins and returns per day for cotton were considerably higher than those of other crops and we would expect the area under cotton and yields to remain at pre-reform levels (Table 5.1 and Diagrams 5.1 and 5.2).

Diagram 5.1: Gross Margins to Cotton vis-à-vis Competing Crops, Where Deficiency Payments are Made, Applying 2006 Production and Cost Data



Source: LMC estimates

Table 5.1: Returns under a Deficiency Payment System, Applying 2006 Cost Data to 2005 Production (€ per hectare)

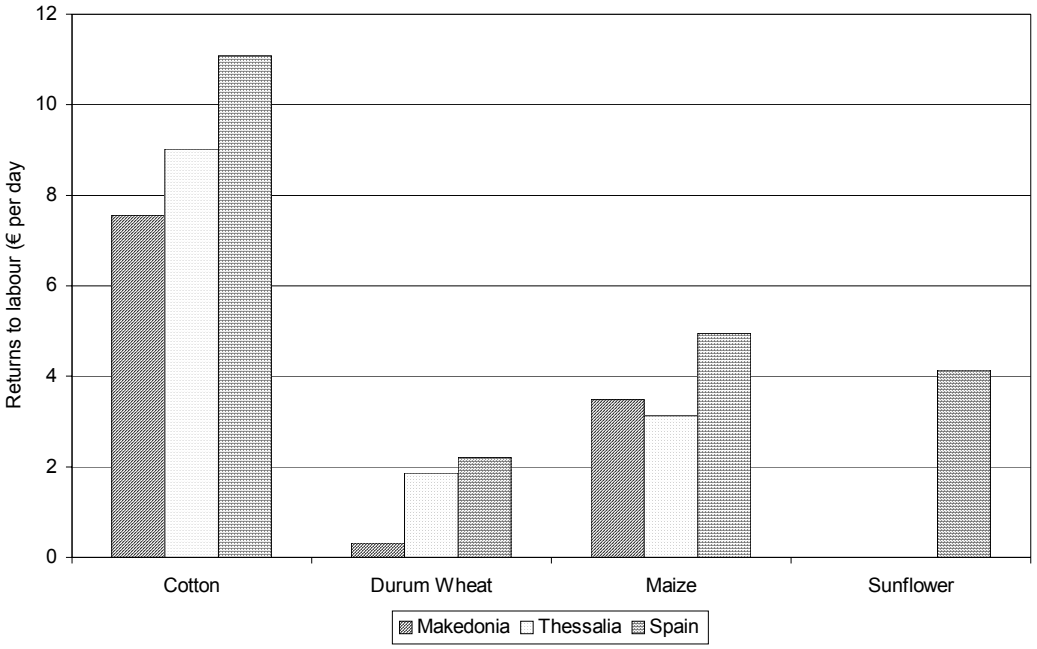
	Cotton	Durum Wheat	Maize	Sunflower
Makedonia				
Revenue				
Price per tonne (€/t)	839.0	146.6	142.9	
Yield (t/ha, unginned)	3.1	2.6	11.8	
Coupled Payment (€/ha)				
Durum Wheat zone supplement (€/ha)				
Quality premium ((€/ha)		40.0		
Total Revenue	2,638.7	418.2	1,690.1	
Variable Cost (excluding Family Labour)	1,168.6	381.2	1,013.3	
Gross Margin	1,470.1	37.1	676.9	
Unpaid Labour (hrs)	194.6	78.9	193.8	
Return to unpaid labour	7.6	0.5	3.5	
Thessalia				
Revenue				
Price per tonne (€/t)	867.0	146.6	142.9	
Yield (t/ha, unginned)	3.6	3.9	11.6	
Coupled Payment (€/ha)				
Durum Wheat zone supplement (€/ha)				
Quality premium ((€/ha)		40.0		
Total Revenue	3,164.2	611.4	1,654.6	
Variable Cost (excluding Family Labour)	1,176.8	429.4	1,049.1	
Gross Margin	1,987.4	182.0	605.5	
Unpaid Labour (hrs)	220.3	97.9	193.8	
Return to unpaid labour	9.0	1.9	3.1	
Spain				
Revenue				
Price per tonne (€/t)	908.0	138.9	128.9	233.0
Yield (t/ha, unginned)	4.1	3.4	12.3	2.2
Coupled Payment (€/ha)		59.9	115.0	59.9
Durum Wheat zone supplement (€/ha)		71.3		
Quality premium ((€/ha)		40.0		
Total Revenue	3,750.7	642.7	1,695.0	572.5
Variable Cost (excluding Family Labour)	1,732.8	346.0	1,185.2	317.1
Gross Margin	2,017.9	296.7	509.9	255.3
Unpaid Labour (hrs)	182.1	134.0	103.0	59.8
Return to unpaid labour	11.1	2.2	4.9	4.3

Source: LMC estimates derived in Chapter 3.

Our assumption is areas and outputs in this case would be the actual observed 2005 levels. There would be a total of 363,000 hectares under cotton in Greece (151,000 hectares in Makedonia and 212,000 in Thessalia), with average yields of 3.1 tonnes per hectare. FADN data suggest that yields are higher in Thessalia than in Makedonia.

In Spain 86,000 hectares would be under cotton, with an average yield of 4.1 tonnes of unginned cotton per hectare.

Diagram 5.2: Returns to Unpaid Labour Cotton vis-à-vis Competing Crops Where Deficiency Payments are Made, Applying 2006 Cost Data to 2005 Production



Source: LMC estimates

THE 2004 REFORM SCENARIO

Greece

After the implementation of the reform in 2006, returns to cotton farmers changed from a single payment from the ginners, which included the Aid, to a payment from the ginner (based on the world price) and a cotton area payment (the coupled payment).

In Makedonia-Thraki, gross margins (excluding family labour) fell €132 per hectare, but the cotton area rose. The fall was partly a result of adverse weather conditions. Without poor weather, the gross margin would have been €323 per hectare (Table 5.2).

Table 5.2: Makedonia – 2006 Returns After Reform to the Cotton Regime (€ per hectare)

	Cotton (Normal yields)	Cotton (2006)	Durum Wheat	Maize
Price per tonne (€/t)	317	317	147	143
Yield (t/ha, unginned)	3.1	2.5	2.6	11.8
Coupled Payment (€/ha)	528.6	528.6	0.0	0.0
Durum Wheat zone supplement (€/ha)			0.0	
Quality premium ((€/ha)			40.0	
Agro-environmental payment				
Total Revenue	1,511	1,320	418	1,690
Variable Cost (excluding Family Labour)	1,188	1,188	381	1,013
Gross Margin	323	132	37	677
Unpaid Labour (hrs)	195	195	79	194
Return to unpaid labour	1.7	0.7	0.5	3.5

Source: LMC estimates derived in Chapter 3.

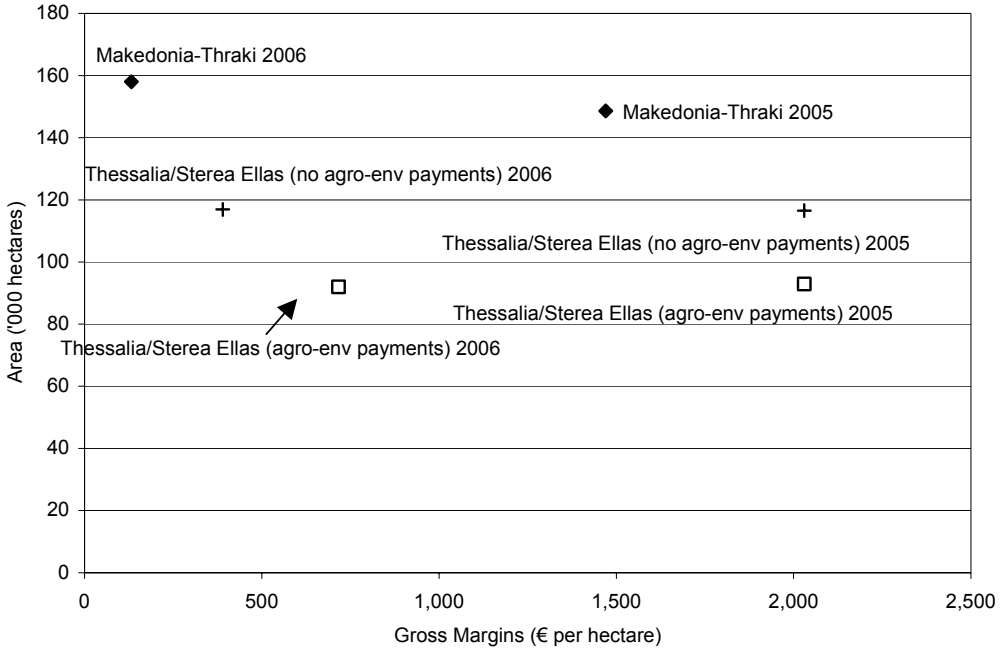
In Thessalia Sterea/Ellas, where agri-environmental payments are available to almost half of producers, the gross margin fell to €390 per hectare for producers not receiving agri-environmental payments and €716 per hectare for producers receiving these payments in 2006 (Table 5.3). A reduction in yields due to adverse weather conditions was less of a factor in Thessalia/Sterea Ellas than was the case in Makedonia-Thraki. For the respondents in the survey, the area was virtually unchanged from the 2005 level. Diagram 5.3 depicts the changes between 2005 and 2006

Table 5.3 Thessalia – 2006 Returns After the Reform to the Cotton Regime (€ per hectare)

	Cotton	Cotton (agri-environ payments)	Durum Wheat	Maize
Price per tonne (€/t)	309	309	147	143
Yield (t/ha, unginned)	3.4	2.5	3.9	11.6
Coupled Payment (€/ha)	528.6	528.6	0.0	0.0
Durum Wheat zone supplement (€/ha)			0.0	
Quality premium ((€/ha)			40.0	
Agro-environmental payment		542.0		
Total Revenue	1,567	1,843	611	1,655
Variable Cost (excluding Family Labour)	1,177	1,127	429	1,049
Gross Margin	390	716	182	605
Unpaid Labour (hrs)	220	230	98	194
Return to unpaid labour	1.8	3.1	1.9	3.1

Source: LMC estimates derived in Chapter 3.

Diagram 5.3: The Relationship between Gross Margins and Area, Greece



Source: LMC derived from Questionnaire

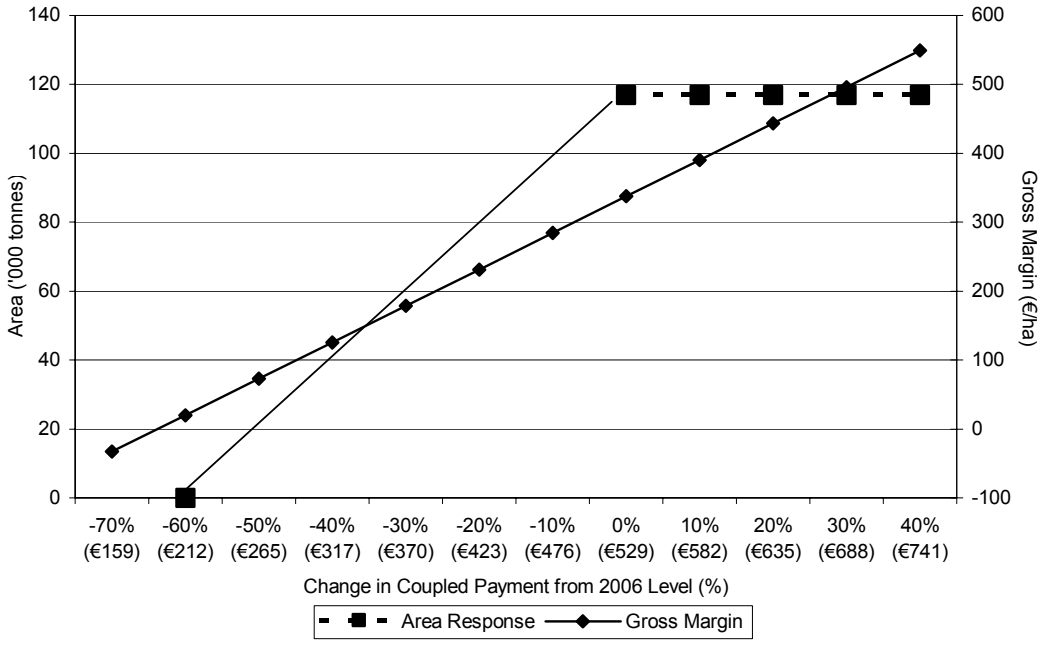
Note: Growers in Makedonia-Thraki do not receive agri-environmental payments

The Impact of Variations in the Coupled Payments

In assessing the impact of changes to the regime, we note that:

- Farmers in Makedonia-Thraki will continue to plant cotton in preference to durum wheat providing the gross margin is above that of durum wheat (€37 per tonne). At some point, if the gross margin for cotton falls far enough below its level in 2006 (which would have been €323 per tonne if yields had not been affected by weather), farmers will switch away from cotton. This point is reached when the coupled payment is reduced by 60% (Diagram 5.4).

Diagram 5.4: Relationship between Gross Margins and Area, Makedonia-Thraki



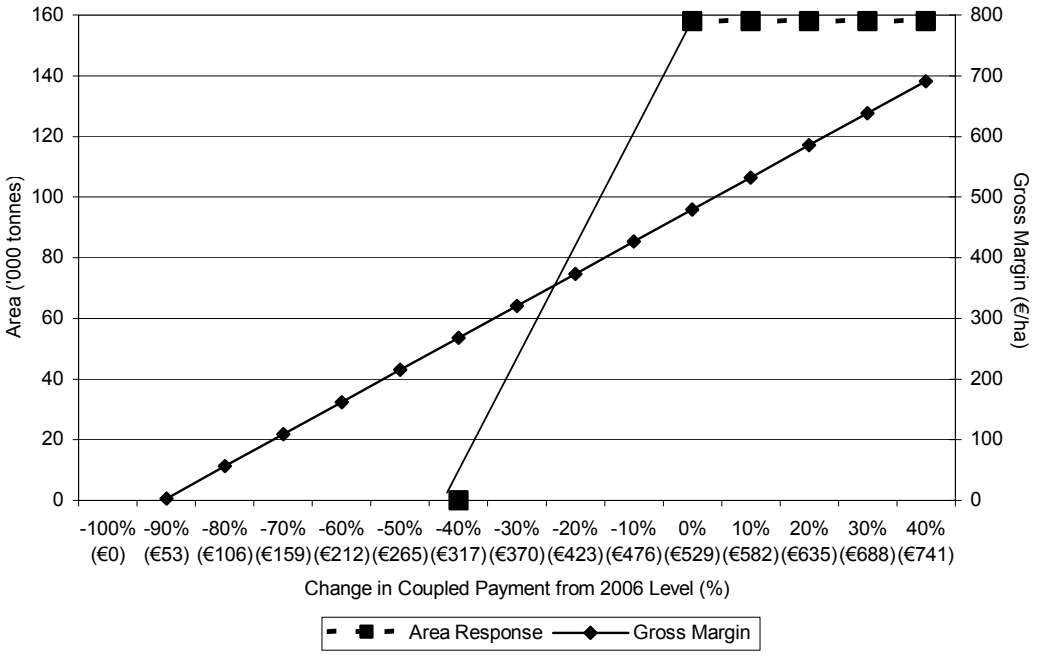
Source: LMC estimates

- In Thessalia/Sterea Ellas, we divide the observations in the survey between those receiving the agri-environmental payments and those not receiving the payments. (Note: these payments are not made in Makedonia-Thraki). With a positive return to durum wheat, the decision to switch away from cotton to durum wheat will depend upon the relative return for the two crops.

- With normal yields, the gross margin for producers receiving agri-environmental payments would need to fall from €716 to €182 per hectare before gross margins were equalised on cotton and durum wheat, while for farmers not receiving agri-environmental payments, the gross margin would need to fall from €390 to €182 per hectare.

- In the former case, even with no coupled payments, the returns are still greater than those from durum wheat; hence production would be expected to continue. For producers not receiving agri-environmental payments, the point where the gross margin for cotton equals that on durum wheat, and where switching would be expected to occur is when the coupled payment falls by 40% (Diagram 5.5).

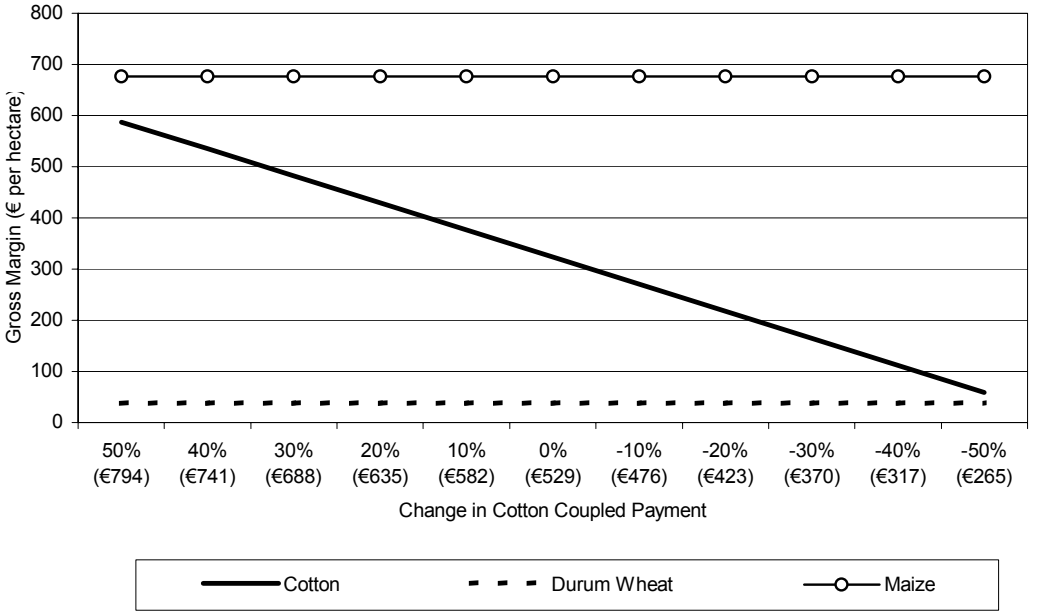
Diagram 5.5: Relationship between Gross Margins and Area, Thessalia/Sterea Ellas, in the Case of No Agri-environmental Payments



Source: LMC

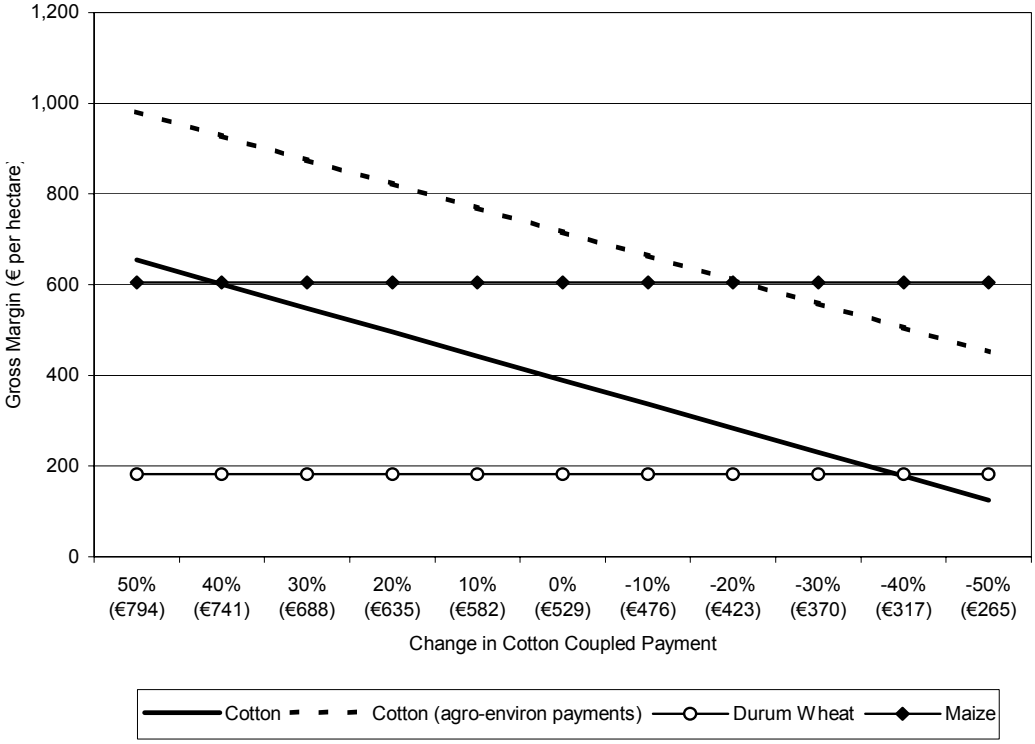
The relationship between gross margins for cotton and competing crops and changes in the decoupled payment for cotton is illustrated in Diagrams 5.6 and 5.7.

Diagram 5.6: Cotton Gross Margins vis-a- vis Major Competing Crops, Makedonia-Thraki



Source: LMC estimates, derived from Questionnaires

Diagram 5.7: Cotton Gross Margins vis-a- vis Major Competing Crops, Thessalia/Sterea Ellas



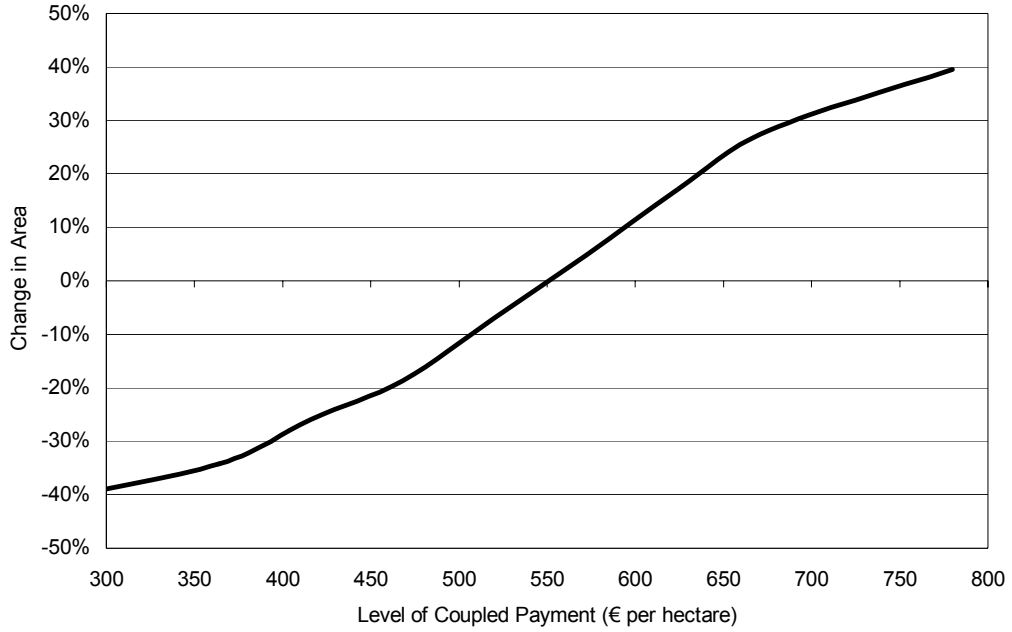
Source: LMC estimates, derived from Questionnaires

In the absence of any response from farmers in terms of the area planted to cotton following the change in regime, we are able to derive their expected reactions to changes to the level of coupled payment by analysing the questionnaire responses. The results are summarised in Diagrams 5.8 and 5.9. Using these responses, we are able to derive the adjustments expected in the cotton area as the coupled payment changes. The results are presented in Tables 5.4 and 5.5.

In terms of the production of unginned cotton, it is important to ask whether a situation could occur, such as in Spain, where gross margins are found to be higher with a lower input-output system than with the traditional mode of production. To model this, we assume the same level of yield and input reduction in Greece as has occurred in Spain and determine the impact of this change on gross margins.

This analysis is carried out for farms that do not receive agri-environmental payments. In both Makedonia and Thessalia, we discover that gross margins are higher under the traditional production system, and we therefore do not expect farmers to adopt a lower input system in light of the reforms. While planted areas may change, average yields are expected to remain unchanged and this provides the basis for our production simulations. These generate the results presented in Tables 5.4 and 5.5.

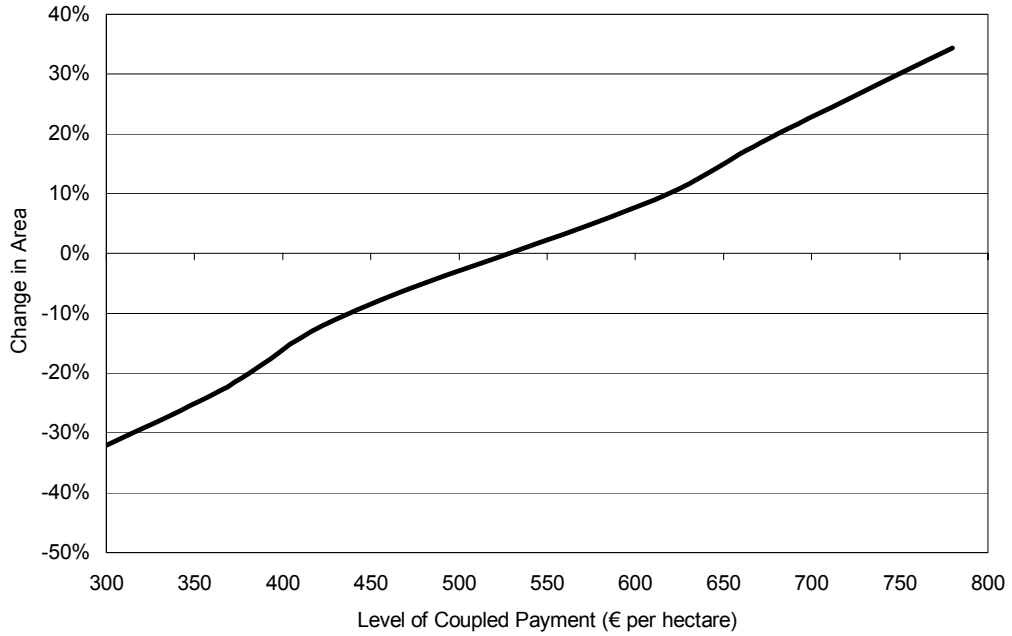
Diagram 5.8: Impact of Changes in Coupled Cotton Payments on Areas, Analysis of the Questionnaire Responses – Makedonia



Note: The curve is based on a weighted average of responses where, for the upper and lower extremes, a change of greater than 30% was given the value 40% or and one of less than -30% was given the value –40%.

Source: Questionnaire

Diagram 5.9: Impact of Changes in Coupled Cotton Payments on Areas, Analysis of the Questionnaire Responses – Thessalia



Note: The curve is based on a weighted average of responses where, for the upper and lower extremes, a change of greater than 30% was given the value 40% or and one of less than -30% was given the value –40%.

Source: Questionnaire

Table 5.4: Estimated Unginned Cotton Production as Coupled Payments Change, Makedonia

Change in coupled payment	Coupled Payment € per ha	Change in area	Total Area 000 ha	Total Production 000 tonnes
+ 50%	793.5	39%	209	658
+ 40%	740.6	34%	201	631
+ 30%	687.7	28%	192	605
+ 20%	634.8	17%	176	552
+ 10%	581.9	5%	157	494
0%	529	-7%	150	472
- 10%	476.1	-19%	122	383
- 20%	423.2	-26%	111	350
- 30%	370.3	-34%	99	310
- 40%	317.4	-38%	93	293
- 50%	264.5	-42%	88	276

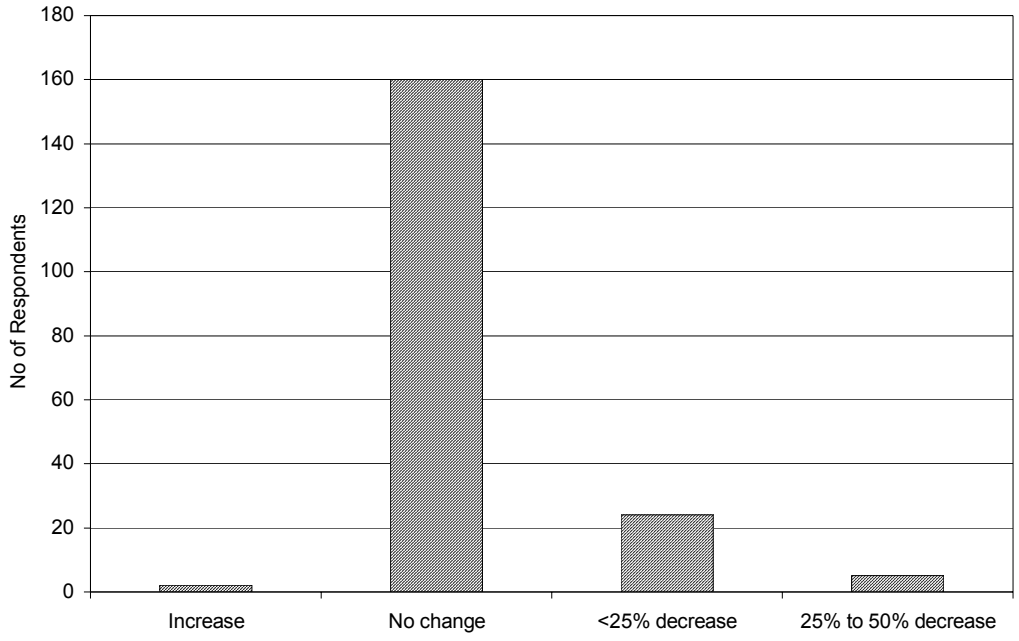
Source: Derived from Diagram 5.8.

Introduction of an Obligation to Harvest

Unlike in Spain, the change in the cotton regime has not had a major impact on Greek cotton yields. The fall in yields in 2006 can be attributed to adverse weather conditions.

In terms of the effect of paying the coupled payment on boll opening, most producers surveyed suggested that this had had no effect on input use (Diagram 5.10).

Diagram 5.10: The Effect of the Coupled Payment on Boll Opening on Input Use



Source: Questionnaire

Table 5.5: Estimated Unginned Cotton Production as Coupled Payment Changes, Thessalia

Change in Coupled Payment	Coupled Payment	Change in Area	Total Area	Area (Agri-environmental)	Production (agri-environmental)	Other Area	Production (Other)	Total Production
	€ per ha		000 ha	000 ha	000 tonnes, unginned cotton	000 ha	000 tonnes, unginned cotton	000 tonnes, unginned cotton
+ 50%	794	34%	285	92	248	193	648	896
+ 40%	741	27%	269	92	248	177	594	842
+ 30%	688	19%	253	92	248	161	540	789
+ 20%	635	11%	235	92	248	143	480	728
+ 10%	582	5%	222	92	248	130	436	684
0%	529	-1%	212	92	248	120	403	651
- 10%	476	-6%	199	92	248	107	358	606
- 20%	423	-13%	184	92	248	92	310	558
- 30%	370	-23%	163	92	248	71	239	488
- 40%	317	-30%	148	92	248	56	188	436
- 50%	265	-38%	132	92	248	40	136	384

Source: Derived from Diagram 5.9

Spain

As set out in Chapter 3, under the reformed regime, growers face four production options:

1. To maintain production using traditional production techniques with yields of around four tonnes per hectare.

2. Reduce input use (and production costs) and claim the additional agri-environmental payment.

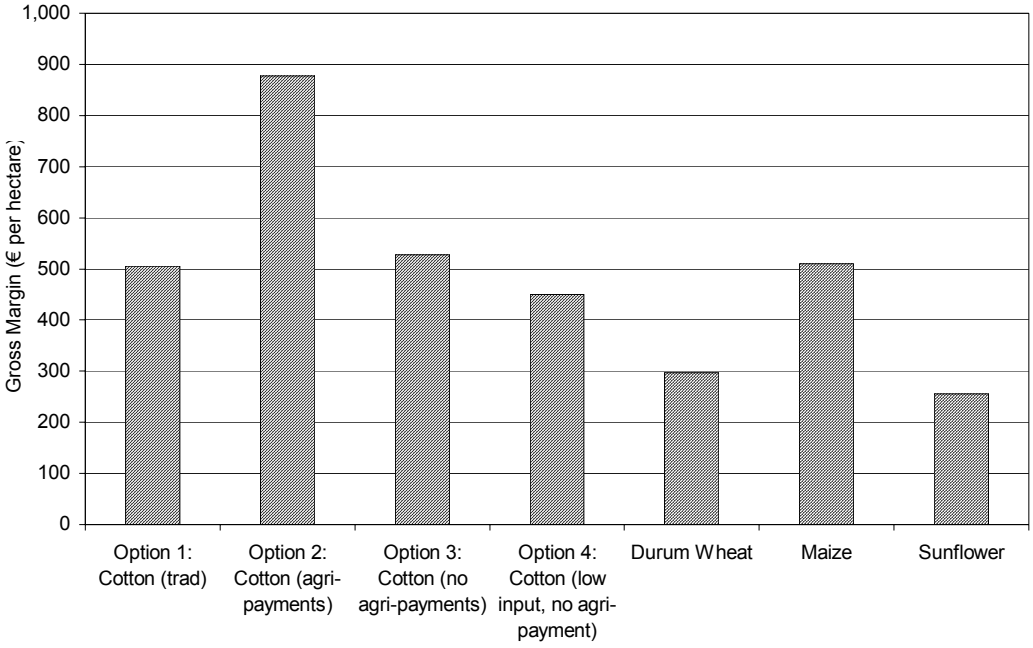
3. Reduce input use, but without claiming the agri-environmental payment.

4. Reduce inputs to a minimal level, a level just sufficient to receive the coupled payment.

Faced with the four choices, gross margins are found to be highest for option 2, i.e., when yields are deliberately reduced and the agri-environmental payment is received. The gross margin is similar for options 1 and 3, in both of which the supplementary payment is received. However, option 3, with the less intensive farming system, generates a higher return to unpaid labour. The gross margin for the low input-low output system, option 4, is the lowest (Table 5.6 and Diagram 5.11).

Maize has the highest gross margin of the alternative crops and its gross margin is similar to those of cotton in options 1 and 3. The higher returns per day for maize than under these options provides one of the reasons why there was a switch away from cotton (Table 5.6 and Diagram 5.11).

Diagram 5.11: Gross Margins, Cotton vis-a-vis Competing Crops in Spain



Source: Table 5.6

Table 5.6: Spain - Returns Following the Reform to the Cotton Regime (€ per hectare)

	Cotton (trad)	Cotton (agri-env payments)	Cotton (no agri-env payments)	Cotton (low input-low output)	Durum Wheat	Maize	Sunflower
Price per tonne (€/t)	244	244	244	244	139	129	233.0
Yield (t/ha, unginned)	4.1	2.6	2.6	1.0	3.4	12.3	2.2
Coupled Payment (€/ha)	1,039.0	1,039.0	1,039.0	1,039.0	59.9	115.0	59.9
Agri environmental (€/ha)		350.0					
Supplementary Payment (€/ha)	191.0	191.0	191.0				
Durum Wheat zone supplement (€/ha)	.				71.3		
Quality premium ((€/ha)					40.0		
Total Revenue	2,238	2,206	1,856	1,283	643	1,695	565
Variable Cost (excluding Family Labour)	1,733	1,328	1,328	833	346	1,185	317
Gross Margin	505	878	528	450	297	510	248
Unpaid Labour (hrs)	182	153	153	127	134	103	60
Return to unpaid labour	2.8	5.7	3.4	3.5	2.2	4.9	4.1

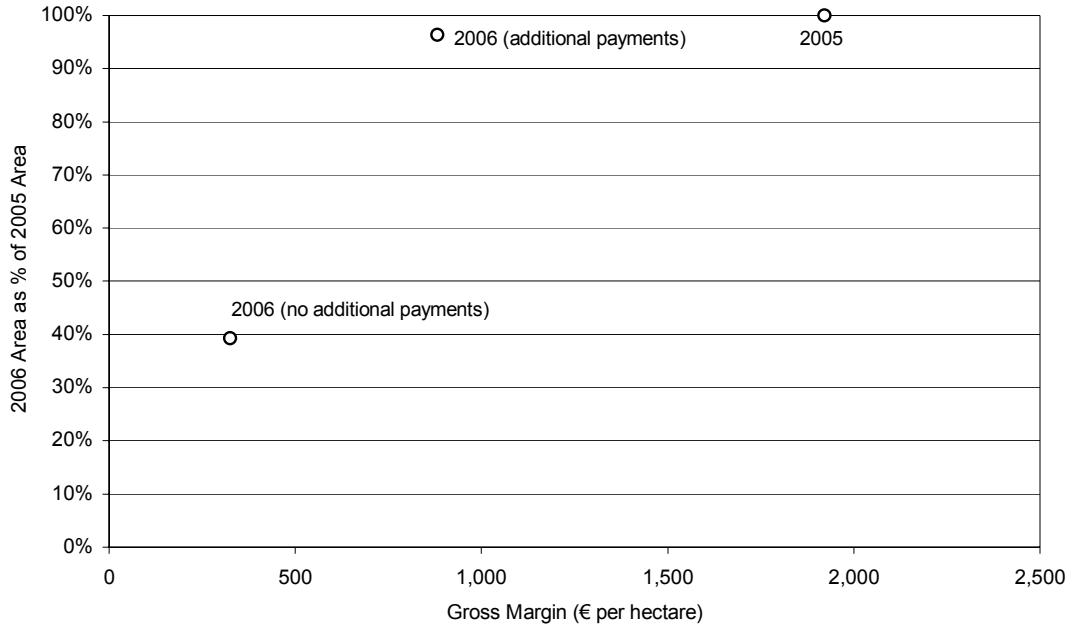
Note: Prices for the cereals are based on the average prices of the past three years. This is because this will help in determining farmers' expectations.
Costs for the low input-low output are based on the assumption that input costs fall by 75%, irrigation costs by 60%, and other costs by 50%, labour costs fall by 25% from the 2005 average.

Source: LMC, Tables 3.21 to 3.24.

The Impact of Variations in the Share of Decoupling

For growers who planted cotton in 2006, we can derive a base area for 2005 from the survey responses[1]. If we set this base level at 100% for each group in 2005, we can plot how the change in the gross margin affected the planting decision for each group (Diagram 5.12).

Diagram 5.12: Change in the Cotton Area and in the Gross Margin in Spain, 2006 versus 2005



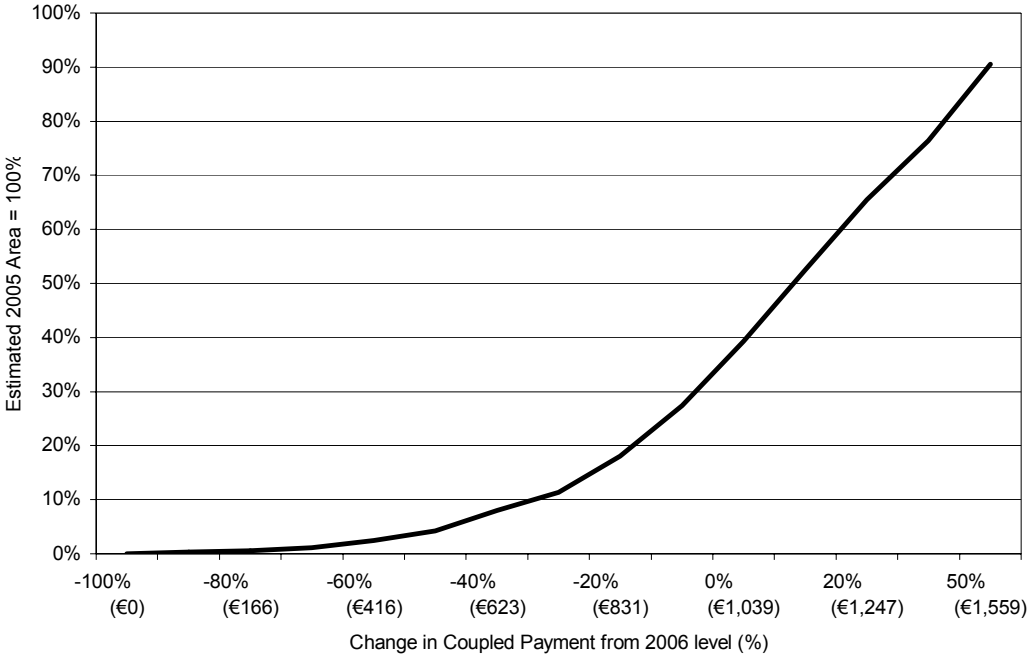
Note: For 2005 a 100% observation is the total area for each group, i.e., 51,309 hectares for producers receiving additional payments and 23,792 hectares for producers not receiving additional payments

Source: Derived from Questionnaire responses, Table 3.31

Once a logistic curve is fitted to the observations, we can then estimate how the level of plantings would alter in response to a given change in the level of coupled payment. Diagrams 5.13 and 5.14 reveal the relationship for each grouping. Summing the observations gives us the total area response (Table 5.7).

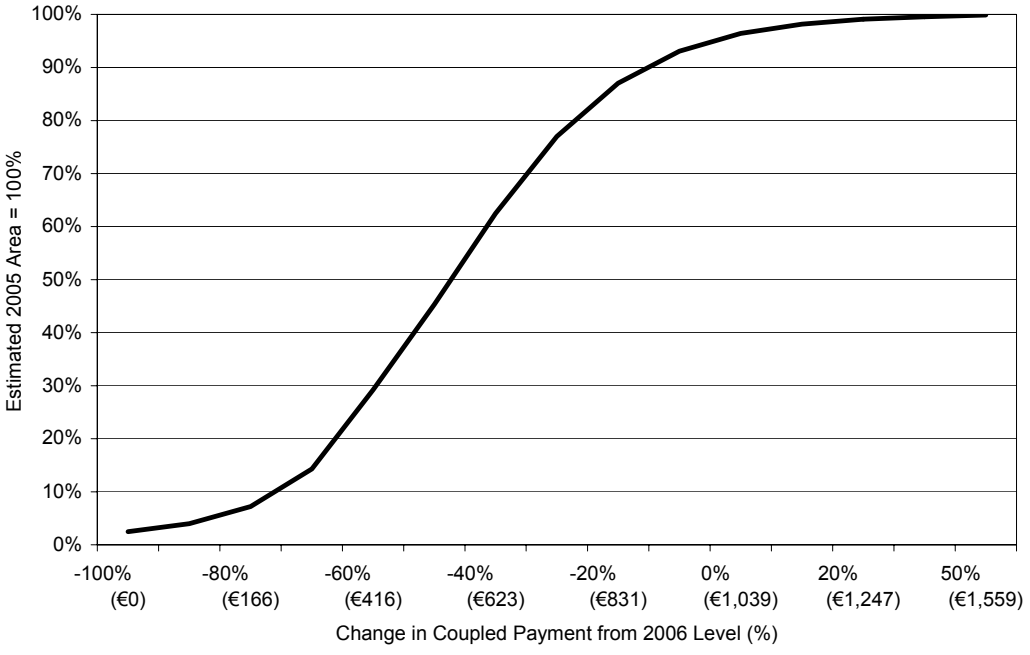
[1] For farmers who received the agri-environmental payment, the area under cotton fell by 4% during 2006. 49,478 hectares were covered by the programme in 2006; hence their implied area in 2005 was 51,309 hectares (49,478/(1-0.04)). For farmers not under the programme, their area was 34,749 hectares in 2005 (86,058 – 51,309). For these farmers, their area fell by 61% during 2006 to 13,641 hectares.

Diagram 5.13: Simulation of Effect of Changes in Coupled Payment on Cotton Area, for Farms Receiving no Additional Payments in Spain



Source: LMC

Diagram 5.14: Simulation of Effect of Changes in Coupled Payment on Cotton Area, for Farms Receiving Additional Payments in Spain



Source: LMC

Table 5.7: Simulation of the Effect of Changing the Level of Coupled Support on the Area under Cotton in Spain (hectares)

		Gross Margin	Gross Margin	Area Response Curve	Area Response Curve	Area Under Cotton	Area Under Cotton	.
	Coupled Payment	Cotton (no payments)	Cotton (Payments)	Cotton (no payments)	Cotton (Payments)	Cotton (no payments)	Cotton (Payments)	Total Area
+ 50%	1,559	702	1,331	90%	100%	31,445	51,180	82,625
+ 40%	1,455	611	1,241	85%	100%	29,450	51,089	80,539
+ 30%	1,351	520	1,150	76%	99%	26,564	50,934	77,497
+ 20%	1,247	429	1,059	65%	99%	22,746	50,669	73,416
+ 10%	1,143	339	968	53%	98%	18,254	50,224	68,478
0%	1,039	248	878	39%	96%	13,641	49,478	63,119
- 10%	935	157	774	27%	94%	9,521	48,019	57,540
- 20%	831	66	670	18%	89%	6,275	45,534	51,809
- 30%	727	-24	566	11%	81%	3,962	41,553	45,515
- 40%	623	-115	462	7%	70%	2,429	35,764	38,193
- 50%	520	-206	358	4%	55%	1,461	28,431	29,892

Source: LMC.

The reason for these changes in the area under cotton is the reduction in gross margin. As the gross margin for cotton falls, so other crops become more profitable alternatives. Prior to 2006, cotton was the crop with the highest gross margin. Following the reform the relative profitability of cotton has altered compared to the other crops. In Diagram 5.15 we compare the effect of changing the level of coupled payment on the profitability of cotton vis-à-vis durum wheat, maize and sunflower.

For cotton not receiving agri-environmental payments, at the current level of the coupled payment the gross margins are similar to those for maize. Hence, any fall in the level of coupled payment means that maize becomes more profitable, encouraging switching away from cotton. When the cotton coupled payment falls by €300 per hectare, gross margins fall to the level of sunflower.

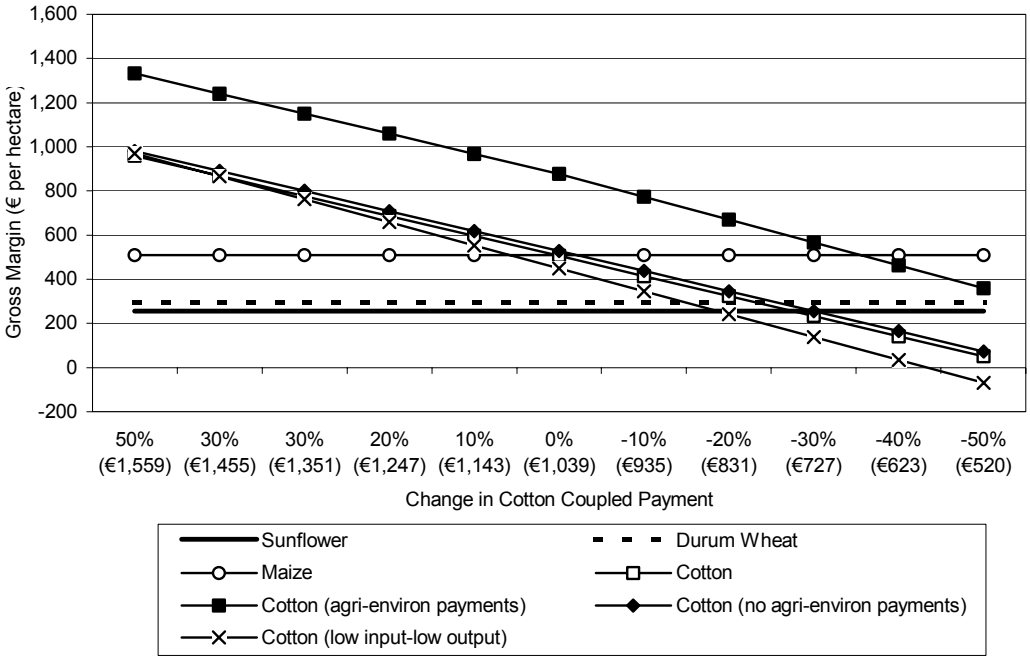
For cotton receiving the additional payments, it is once the coupled payment falls by €400 per hectare that gross margins are reduced to the level of the margins on maize[2]. This is consistent with the analysis in Table 5.7.

[2] In analysing the change in gross margins as the level of coupled payment changes, an allowance has to be made for the change in supplementary payments. This payment is equivalent to 10% of the decoupled payment; hence, as the level of coupled payment falls, the decoupled payment rises and the supplementary payment rises.

We have based our calculation on the assumption that the same area receives the payment each year. In 2006 this calculation is as follows. The total money available for the supplementary payment was 10% of €1,509 (the decoupled payment per hectare) multiplied by 70,000 (the base area in hectares for the decoupled payment). That is €10.5 million.

The actual supplementary payment of €191 per hectare implies that the payment covered 55,300 hectares (€10.5 million divided by €191). In our calculation of the amount paid as supplementary payments as the coupled payment changes, we assume that the payment would cover the same total area, namely 55,300 hectares.

Diagram 5.15: Cotton Gross Margins vis-a- vis Major Competing Crops



Source: Derived from preceding calculations of Gross Margins

In the questionnaire, farmers were also asked about their response to a change in the coupled payment. Diagram 5.16 presents the responses as a weighted average of the total responses.

The questionnaire responses suggest a slightly faster response of the area to a change in coupled payment rate than that implied by the implied gross margin vs. area response curve depicted in Diagram 5.12 until the point where the coupled payment falls by €500. At this point, the two curves coincide.

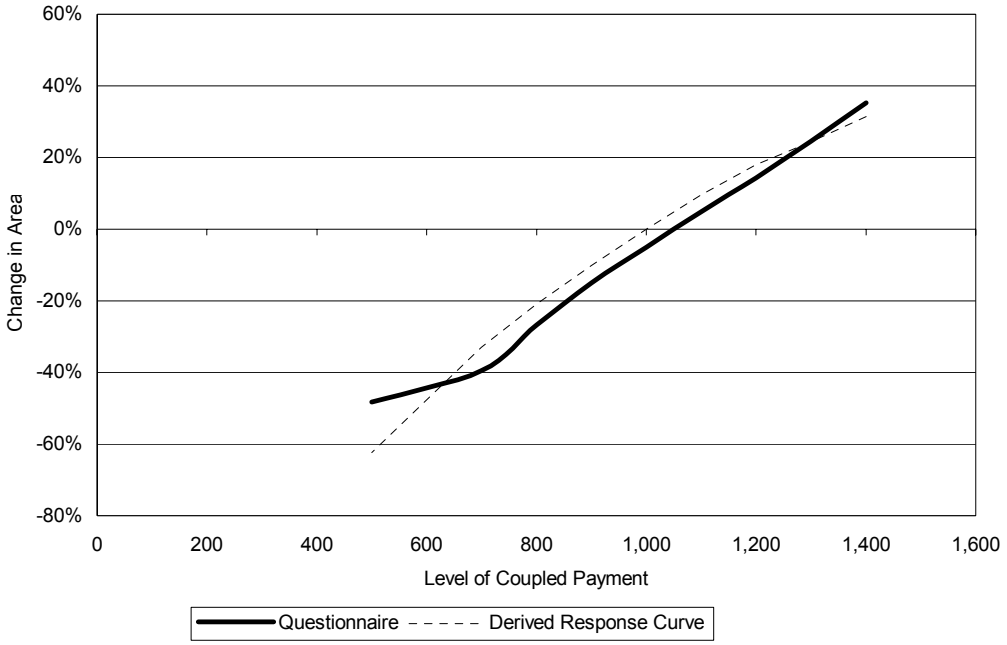
Using similar simulation curves, we can determine what would have happened to the area under cotton if agri-environmental payments were not available. Applying the response curve in Diagram 5.14, these farmers' cotton area would have been expected to fall by 60% at the level of coupled payments prevailing in 2006.

If this had been applied to the entire cotton area, this would have reduced cotton plantings in 2006 to 35,000 hectares. Using the stimulations above, a €200 reduction in the coupled payment would have reduced the cotton area to 15,000 hectares (Diagram 5.17).

In terms of the production of unginned cotton, under the reformed cotton regime, the gross margins for the high input-high output system, where yields were maintained at the same 4.1 tonnes/hectare as in 2005, are lower than those of a lower input system (where yields are in the order of 2.6 tonnes per hectare) whether the agri-environmental payments are being paid or not.

This suggests that yields would be of the order of 2.6 tonnes per hectare across the cotton area under the reformed system. Table 5.8 shows the expected production for the derived cotton areas in this case.

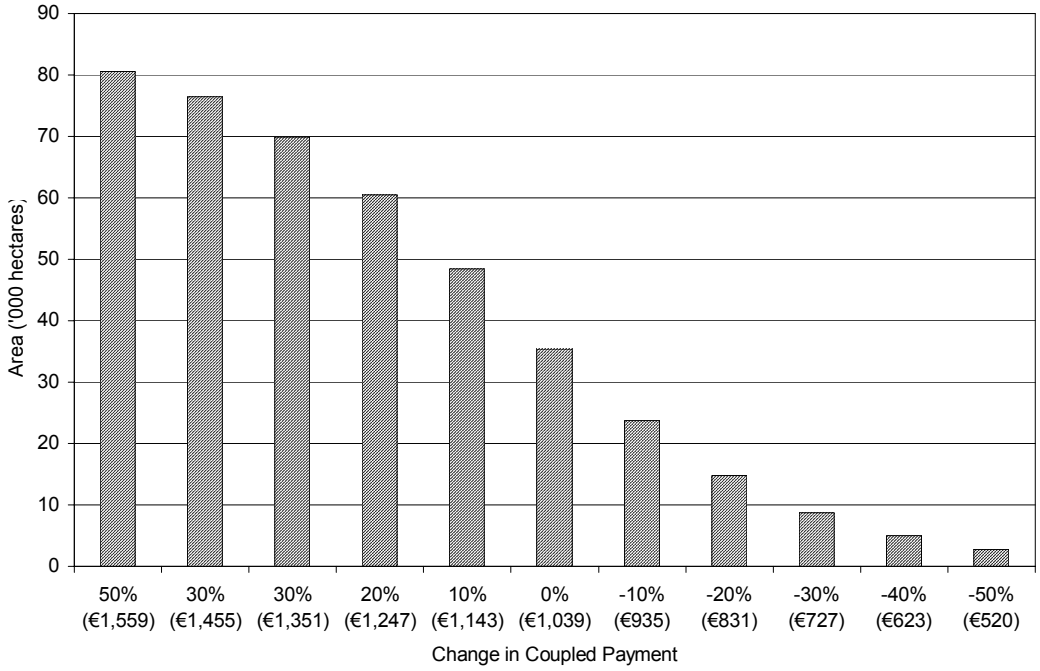
Diagram 5.16: Impact of Change in Coupled Cotton Payment on the Area in Spain - Questionnaire Responses



Note: the questionnaire response curve is based on a weighted average of responses, where a change of greater or less than 30% was given the value 40% and –40% respectively

Source: Questionnaire

Diagram 5.17: Spanish Cotton Areas with No Agri-environmental Payments



Source: Derived from Diagram 5.14

Table 5.8: Estimated Unginned Cotton Production as the Coupled Payment Changes

Change in coupled payment	Coupled Payment € per ha	Total Area (ha)	Production (tonnes, unginned cotton)	Area (no agro-environmental payments) (ha)	Production (tonnes, unginned cotton)
+ 50%	1,559	82,625	214,825	77,875	202,475
+ 40%	1,455	80,539	209,401	72,934	189,629
+ 30%	1,351	77,497	201,493	65,787	171,045
+ 20%	1,247	73,416	190,881	56,333	146,465
+ 10%	1,143	68,478	178,042	45,208	117,540
0%	1,039	63,119	164,109	33,783	87,835
- 10%	935	57,540	149,604	23,578	61,304
- 20%	831	51,809	134,704	15,540	40,404
- 30%	727	45,515	118,339	9,812	25,511
- 40%	623	38,193	99,302	6,015	15,639
- 50%	520	29,892	77,720	3,618	9,406

Source: Derived from Table 1.4

Introduction of an Obligation to Harvest

In order to determine the impact of the requirement in the cotton regime that the coupled payment is paid on the boll opening, rather than harvesting; we examine how the gross margin changes for farmers in each of the four options above, depending upon whether the cotton is harvested or not.

As has been discussed in Chapter 3, it is only in the case of the very low input-output system, where yields of around one tonne per hectare are obtained, that the incentives are greater not to harvest than to harvest. In this event, the costs saved by not harvesting the cotton more than outweigh the loss of revenue from harvesting it.

This option has a lower gross margin than the other cotton production options. However, in practice, some Spanish cotton producers are reported to have switched to this option. This option has the attraction of affording the least risk to producers, while also requiring the smallest cash outlay. Returns per day of family labour under this option also prove to be slightly higher than those where farmers reduce yields but do not receive the agri-environmental payment (Option 3).

Under this low intensity system, the incentives are for producers to reduce costs as much as possible in order to maximise the gross margin, since the trade-off between higher inputs and higher yields does not favour higher inputs.

This option also holds the greatest risk for the ginning industry, as the greater the number of farmers who adopt this option, the less cotton available for ginning.

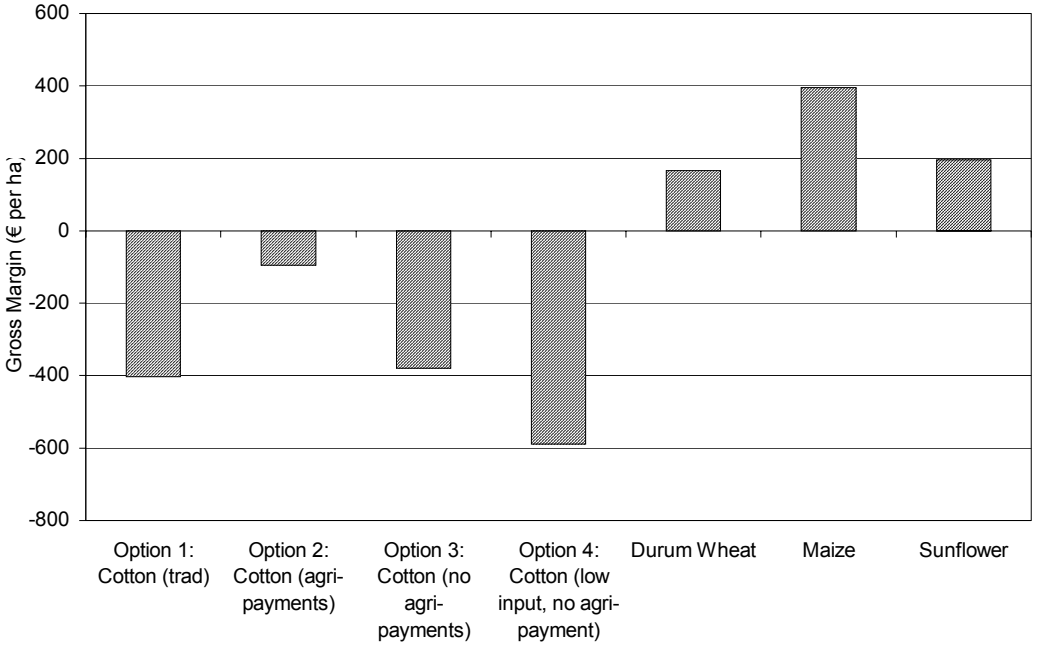
Changing the policy to one where the coupled payment is paid on harvest would mean that any cotton that was not harvested would either be switched to an alternative use where the gross margin is greater than €450 per hectare (or switch back to a more intensive cotton production system). Under the current regime, the gross margins for these two alternatives are very similar.

FULL DECOUPLING

Under a full decoupling system in Spain, where we assume that cereals are also fully decoupled, the margins for cotton turn negative and hence we would expect the area under cotton to fall to zero (Diagram 5.18).

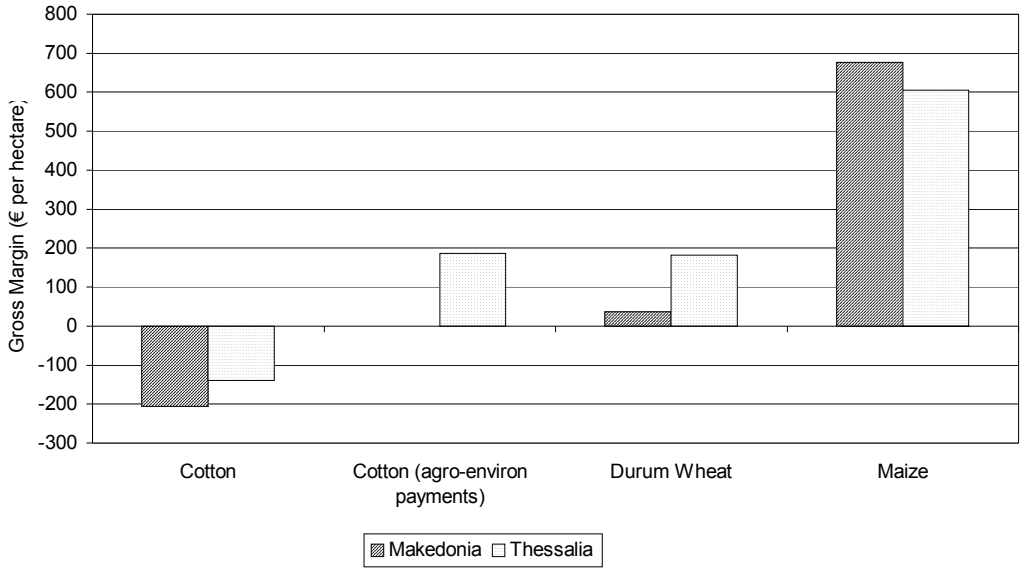
Under a full decoupling system, in Greece the margins for cotton turn negative except in the case where agri-environmental payments are being made. In the case where payments are not being made, we would expect the area under cotton to fall to zero. For cotton where agri-environmental payments are received, gross margins with full decoupling fall to an equivalent level to durum wheat; therefore we would expect cotton production to continue on land receiving these payments (Diagram 5.19). Hence with full decoupling, Greek cotton areas falls back to 93,000 hectares.

Diagram 5.18: Gross Margins with Full Decoupling in Spain



Source: LMC

Diagram 5.19: Gross Margin, Cotton vis-à-vis Competing Crops with Full Decoupling, Greece



Source: LMC

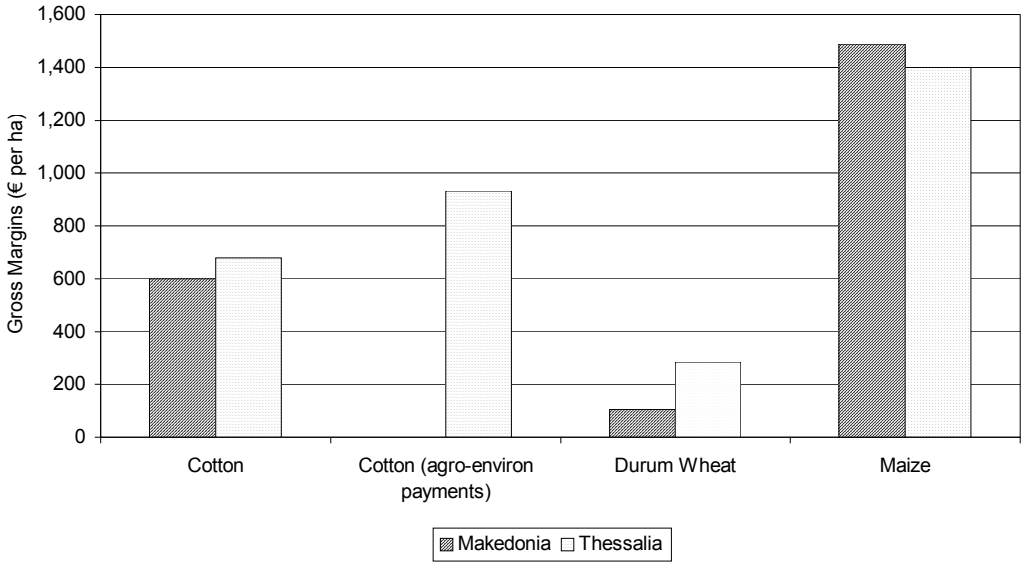
SENSITIVITY ANALYSIS

The speed with which farmers switch between crops depends upon the gross margin, which is a function of both prices and costs. Our analysis in based on the prices that faced producers on planting in 2006. Over time, prices change. For instance, a rise in cereal prices relative to cotton (such as occurred between the time when planting decisions were being made for the 2006 and 2007 crops) would push gross margins further in favour of cereal production and the cotton area would be expected to contract.

To assess changes to gross margins that occur as prices change, we re-work the analysis for the current system using FAPRI long term price projections for 2013/2014 as an example. In this case, cotton prices rise by 28%, durum wheat prices by 18%, maize prices rise by 48% and sunflower seed prices rise 12%.

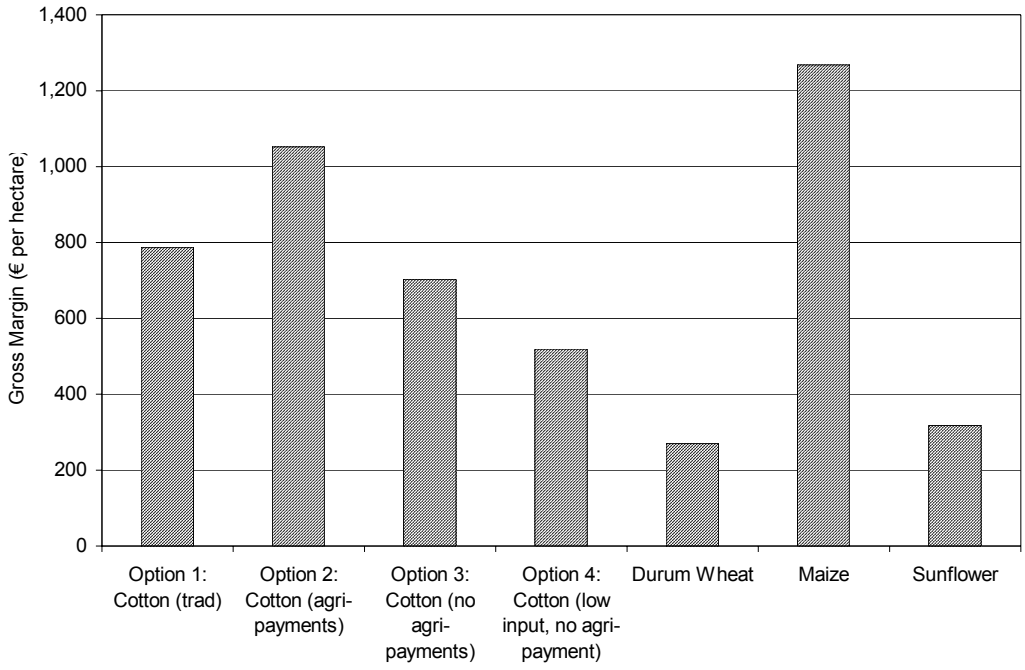
In this case, the returns to maize move above those for other crops and one would expect some switching out of cotton to maize in both Greece and Spain (Diagram 5.20 and 5.21)

Diagram 5.20: Greece, Gross Margins, Cotton vis-à-vis Alternative Crops



Source: LMC

Diagram 5.21: Spain, Gross Margins, Cotton vis-à-vis Alternative Crops



Source: LMC

Chapter 6: The Impact of Different Policy Scenarios on the Cotton Ginning Sector

The effect of regime change has been felt in three ways by the ginning industry:

- Under the new regime, the Aid is not paid though the gins. The gins therefore do not receive the administrative fee that was associated with the old regime. This was set at €53.1 per tonne, unginned cotton.
- The change in regime has altered incentives to producers and, as the areas under cotton and yields per hectare have changed, so has the amount of unginned cotton available to the industry. This has altered capacity utilisation levels.
- There is a widespread feeling among the ginning industry that the requirement that Aid is paid on the opening of the boll rather than harvest of cotton has affected cotton quality.

In this chapter, we consider the effect of the different policy scenarios on the levels of capacity utilisation. The assessment of capacity is based on US averages of the length of season, to apply an independent benchmark. Accordingly, we assume a 81 day ginning season, during which the gins operate for 17.5 hours per day.

THE DEFICIENCY PAYMENT SYSTEM

Under a deficiency payment system, such as prevailed until 2005, where aid is paid on a per tonne basis of unginned cotton, cotton production and capacity utilisation levels would be expected to return to pre-reform levels. In this event, capacity utilisation would be 70% in Greece and 41% in Spain (Table 6.1).

Table 6.1: Capacity Utilisation Under the Deficiency Payment System

	Area ('000 tonnes)	Production ('000 tonnes)	Capacity (%)
Greece	363	1,125	70%
Spain	86	355	41%

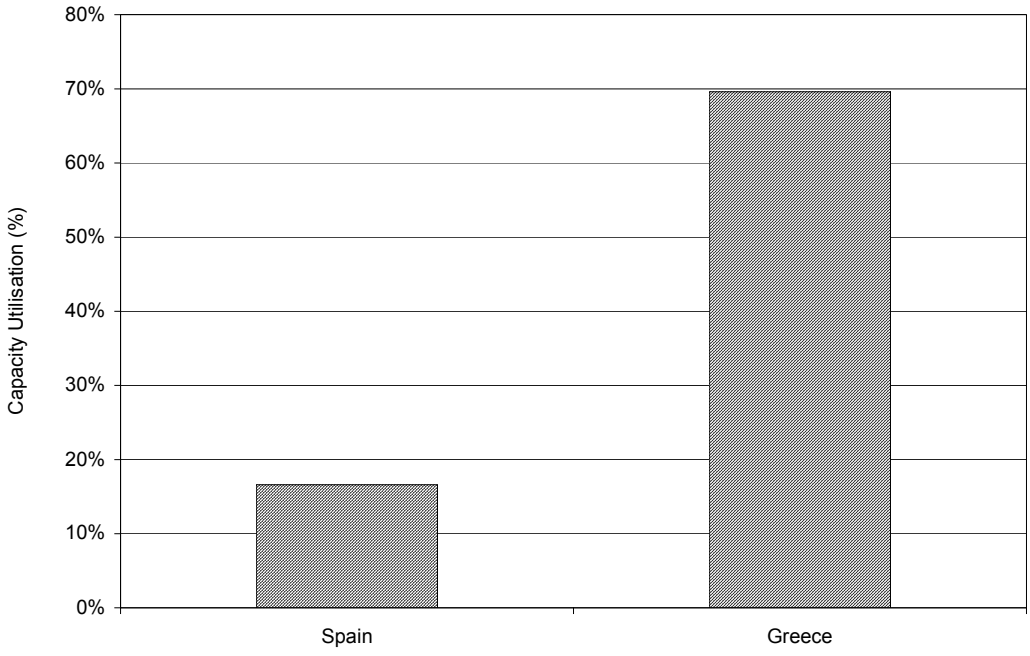
Source: LMC.

THE 2004 REFORM SCENARIO

As explained in Chapter 3, following reform, unginned cotton production has fallen in Greece and Spain, although the reasons for the change are different. In the case of Greece, the change can largely be attributed to poor weather prior to the harvest, while in Spain, the changes in production are more closely linked to the reform.

Following the reform, capacity utilisation levels fell to 56% and 17% in Greece and Spain, respectively. However, with more normal production conditions in Greece, capacity utilisation would have remained at 70% (Diagram 6.1).

Diagram 6.1: Capacity Utilisation Levels, Post-Reform in 2006, Normal Yields



Source: LMC estimates

VARIATIONS IN THE SHARE OF DECOUPLING

Changing the level of coupling alters the gross margins of cotton production. This leads to changes in area and production as set out in Chapter 5. Using these results, in Greece, an increase in the coupled payment by 50% (to €794 per tonne) would cause production to rise to the extent that capacity utilisation levels reach 96%. Conversely, a fall in the coupled payment by 50% (to €265 per tonne) would result in capacity utilisation falling to 41% (Table 6.2).

Table 6.2: The Effect of Changing Capacity Utilisation Levels on Greek Ginning Capacity Utilisation

Change in Coupled Payment	Coupled Payment (€ per hectare)	Area ('000 tonnes)	Production ('000 tonnes)	Capacity (%)
+ 50%	794	494	1,554	96%
+ 40%	741	470	1,474	91%
+ 30%	688	445	1,393	86%
+ 20%	635	410	1,280	79%
+ 10%	582	379	1,178	73%
0%	529	362	1,123	70%
- 10%	476	320	990	61%
- 20%	423	295	908	56%
- 30%	370	262	798	49%
- 40%	317	241	729	45%
- 50%	265	220	660	41%

Source: LMC.

In Spain, an increase in the coupled payment by 50% (to €1,559 per tonne) would lead to higher production and raise capacity utilisation levels to a still meagre 25%. Conversely, a fall in the coupled payment by 50% (to €520 per tonne) would result in capacity utilisation falling to just 9% (Table 6.3). In all simulations for Spain in Table 6.3, capacity utilisation levels are far lower than those under the deficiency payment system. This is because gross margins are higher for a lower yielding production system, with average yields around 2.6 tonnes per hectare rather than 4.1 tonnes per hectare.

A further risk to the ginning sector occurs if farmers switch to a low input-output system. In this case, not only are yields lower, but there is a risk that farmers will not harvest the cotton, further reducing production and capacity utilisation levels. .

Table 6.3: The Effect of Changing Capacity Utilisation Levels on Spanish Ginning Capacity Utilisation

Change in Coupled Payment	Coupled Payment (€ per hectare)	Area ('000 tonnes)	Production ('000 tonnes)	Capacity (%)
+ 50%	1,559	83	215	25%
+ 40%	1,455	81	209	24%
+ 30%	1,351	77	201	23%
+ 20%	1,247	73	191	22%
+ 10%	1,143	68	178	21%
0%	1,039	63	164	19%
- 10%	935	58	150	17%
- 20%	831	52	135	16%
- 30%	727	46	118	14%
- 40%	623	38	99	12%
- 50%	520	30	78	9%

Source: LMC.

FULL DECOUPLING

Under full decoupling, the returns to cotton production fall below those of alternative crops. This causes production to fall to zero in Spain and it is only maintained in Greece where agri-environmental payments are received. In this case, Greek capacity utilisation falls to 14% (Table 6.4).

Table 6.4: Capacity Utilisation Under a Fully Decoupled System in Greece and Spain

	Area ('000 tonnes)	Production ('000 tonnes)	Capacity (%)
Greece	92	230	14%
Spain	0	0	0%

Source: LMC.

Chapter 7: General Conclusions

The cotton reforms of 2004 that were introduced in 2006 have considerably altered the incentives to produce cotton in the EU-15. The regime has changed from one based on production to one based on area where a proportion of the aid is decoupled from the production of the crop. A similar decoupling has occurred for the alternative cereal crops. In Greece, the cereals regime has been fully decoupled, while in Spain 25% of the cereals' Aid remains coupled.

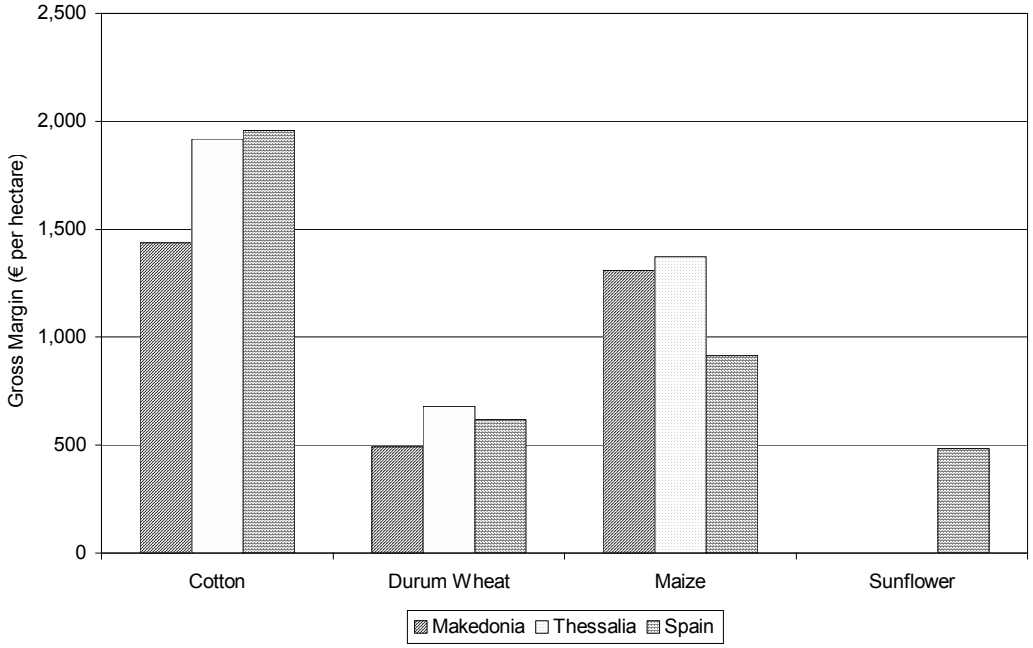
COTTON REGIME PRE-REFORM

The old cotton regime completely insulated growers from the fluctuations in the international price. All price risk was absorbed by the EC. Although where production was higher than the agreed reference levels, prices to the producers were reduced.

Under this regime cotton was the most profitable crop (Diagram 7.1). However, the level of profitability was such that incentives were provided to maintain production rather than expand it. Following the reform to the old regime in 2000, when further penalties were introduced once production exceeded 1.5 million tonnes of unginned cotton, the level of production stabilised. The level of penalties in this case appears to have been sufficient to discourage additional production. This is in contrast to previous regimes under which production continued to expand.

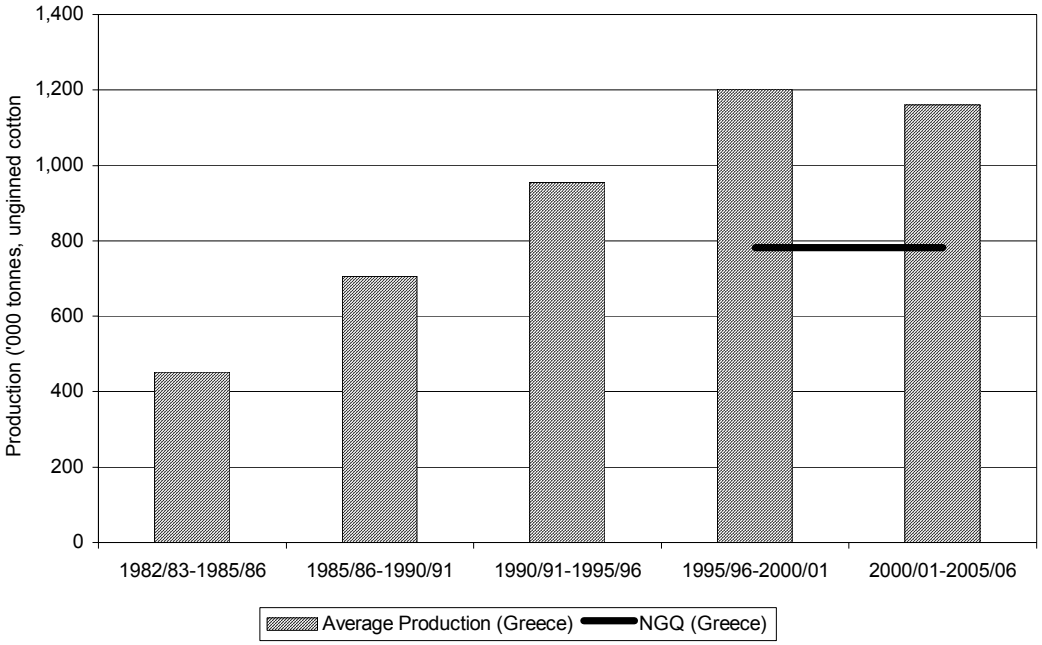
The level of production, however, was still above the National Guaranteed Quantity (NGQ) and hence penalties continued to be imposed. The level of overproduction was greater in Greece than Spain (Diagrams 7.2 and 7.3). As the system was based on production, it encouraged a high input-high output system with high yields.

Diagram 7.1: Gross Margin Cotton Versus Alternative Crops Pre-Reform



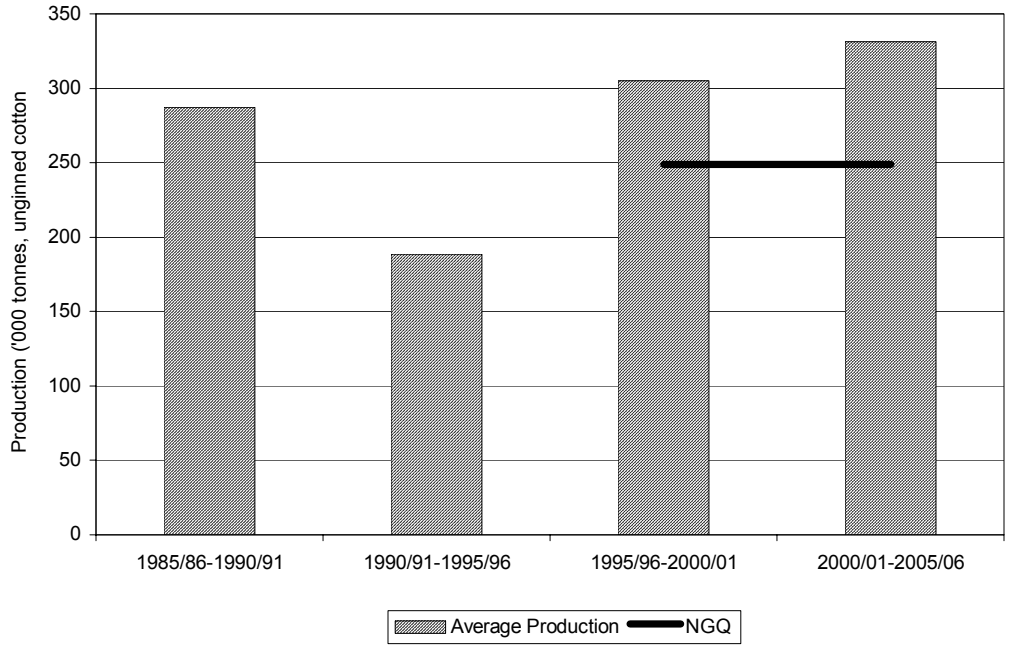
Source: LMC estimates

Diagram 7.2: Greece - Annual Average Cotton Production



Source: DG Agri

Diagram 7.3: Spain - Annual Average Cotton Production



Source: DG Agri

Even, prior to the regime change, there was overcapacity in the ginning industry. There are a number of reasons that led to this overcapacity:

- Ginning was profitable which encouraged its expansion. Profit as a proportion of revenue averaged 14% in Greece and 19% in Spain in 2004 and 2005.

- Ginning unit costs were high by international standards, partly as a result of over capacity. High costs were absorbed via the cotton regime, for two reasons:

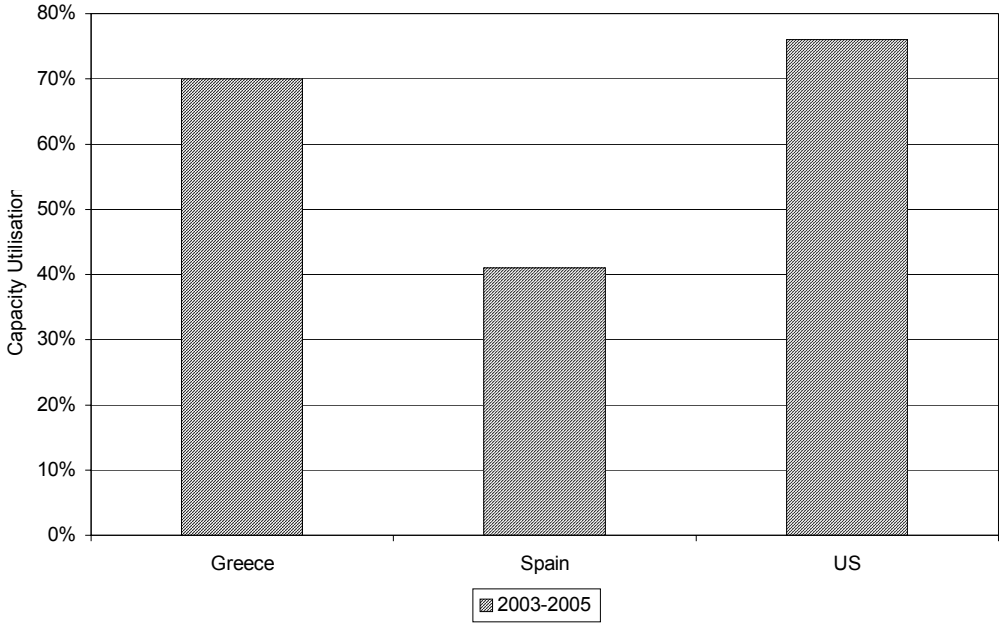
  — The unginned cotton price (which determined the payment of aid) was set at a level between 20.6% and 24.4% of the international price for ginned cotton[1]. For the ginner, this yielded a margin that equalled the difference between the sales price for ginned cotton and the calculated unginned cotton price. This margin had little relationship to an estimate of efficient ginning production costs.

  — The administrative element of the Aid was greater than the cost of administering the scheme; hence, this component provided an implicit subsidy to the ginners.

- In Greece, the high cotton prices seen during the period of 1995-1999 stimulated Turkey to expand its textile production, and in turn, Greece expanded its cotton production for exports to Turkey. By 2000, Greek ginners had expanded processing capacity to meet the demand for more cotton. Production however, did not increase further.

Using a common base for measuring capacity, capacity utilisation level for the whole industry in Greece is estimated to have been 70% in 2005, while in Spain capacity utilisation is estimated at 41% in the same year. For comparison, US capacity utilisation is estimated to be roughly 75% (Diagram 7.4).

Diagram 7.4: Comparison of Average US and EU Ginning Capacity Utilisation



Source: LMC estimates

[1] The actual amount varied according to the underlying world price.

THE REFORM OF THE COTTON REGIME

The change in the cotton regime to a partially decoupled area based system has led to a fall in gross margins and the reactions of producers to this changed situation have been very different in Spain and Greece.

Spain

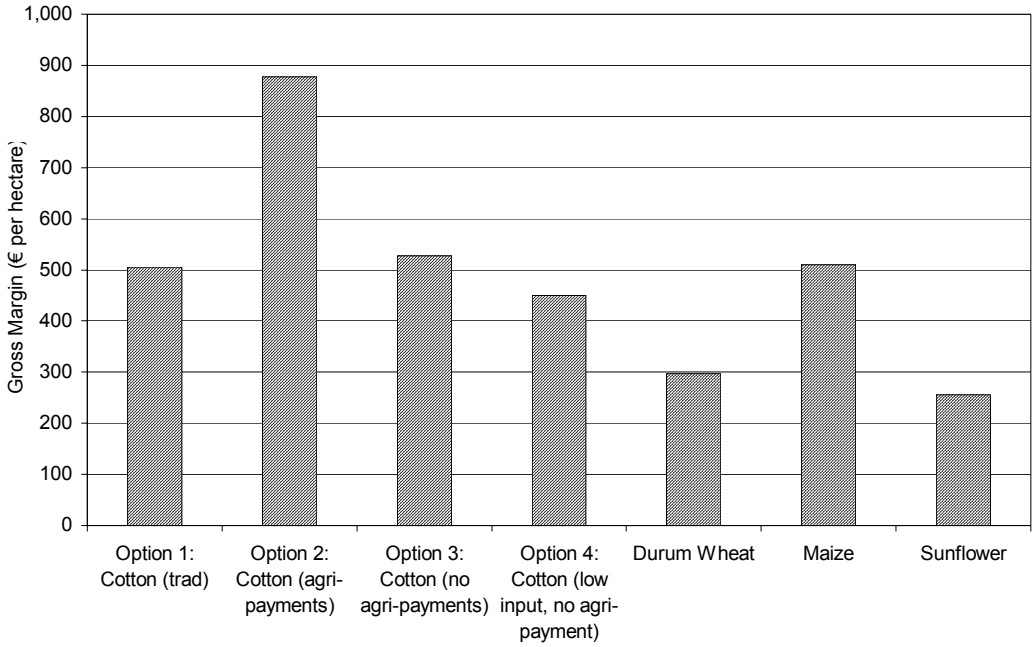
In Spain, gross margins for cotton remain highest when agri-environmental payments are received (option 2) (Diagram 7.5). Although these payments are independent of the cotton regime, they have proved to be an important part of the farmers' decision-making process and the area that qualifies for the payment has increased dramatically. For farmers who receive these payments, the area under cotton has been largely maintained, albeit with a less intensive production system (yields have typically fallen from 4.1 tonnes per hectare to around 2.5 tonnes per hectare).

For farmers who do not receive the payment, the area under cotton has fallen dramatically and we can surmise that, in the absence of the agri-environmental payment, the area under cotton would have fallen further in 2006. In the absence of the payment, if we assume that farmers behave in the same way as those who did not receive the payment, the area under cotton would have fallen to 35,000 hectares in 2006 (compared to the actual planted area of 64,000 hectares).

Even where production has been maintained without the agri-environmental payment, yields have fallen and our analysis suggests that gross margins and returns per day are higher under a lower input-lower output system (Option 3, with yields around 2.5 tonnes per hectare) than is the case with a more intensive production system (Option 1).

A system where yields are further reduced (Option 4, to around one tonne per hectare) is shown to have the lowest gross margin, although the returns per day are similar to the lower input-lower output system where no agri-environmental payments are made. This suggests that some farmers may adopt this option. This case is the only one where it is advantageous for the farmer not to harvest cotton and accept the coupled payment on boll opening.

Diagram 7.5: Spain, Gross Margin to Cotton vis-a-vis Competing Crops, Post Reform



Source: LMC estimates

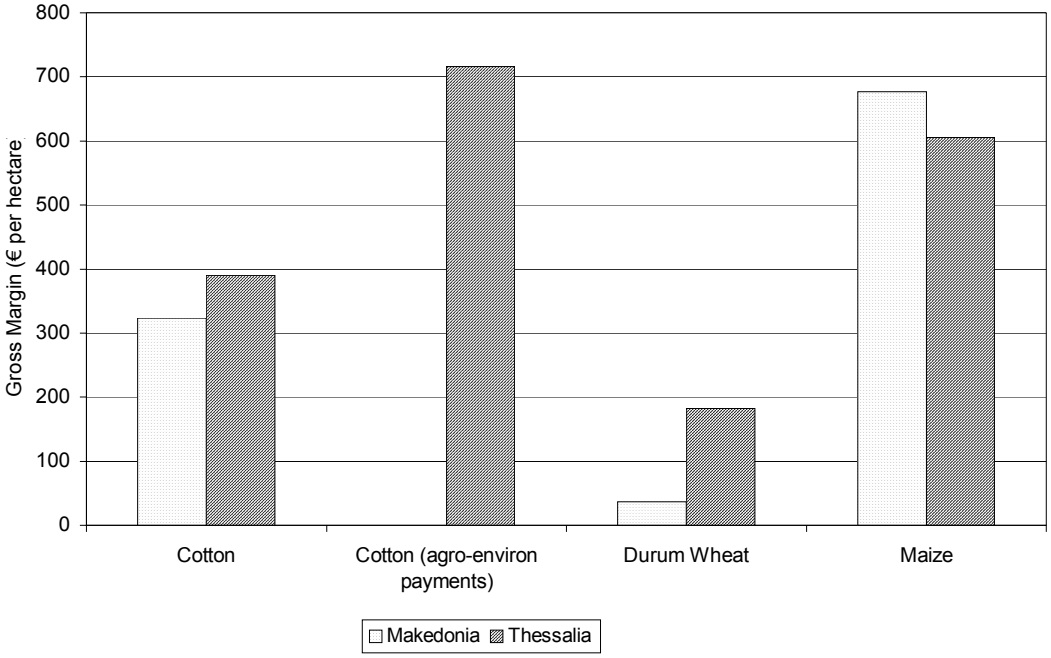
Greece

In Greece, producers have been slower to response to the changes in gross margins and the area under cotton actual rose in 2006. This is partly because returns to other crops have fallen with the decoupling of the cereal regime. The returns to durum wheat, which is considered the main alternative crop by producers, are still below those of cotton.

The anomaly is maize. It has a higher gross margin than cotton, but producers have not switched to it. This is due to a combination of technical and economic factors, as well as a degree of inertia in the Greek industry. The size of farms is relatively small and it is expected to take longer to switch to alternative crops in Greece (Diagram 7.6).

As with Spain, the returns to producers receiving agri-environmental payments are higher than the alternative annual crops. However, there has not been an increase in the area of production receiving these payments. The higher returns to cotton production receiving the agri-environmental payments than that not receiving such payments is partly due to the method of calculating the payment. It is based on profits and margins calculated prior to the reform, rather than those that exist after the reform.

Diagram 7.6: Greece, Gross Margin to Cotton vis-a-vis Competing Crops, Post Reform



Source: LMC estimates

Ginning

The change to the cotton regime has reinforced the problem of overcapacity in the ginning industry in Spain. Capacity utilisation, on the basis of an 81 day season, has fallen to just 17%. In Greece with no change in the area, the effect of the reform has been more neutral. The fall in production during 2006 was due to adverse weather conditions rather than a change in production technology and can be considered a temporary measure.

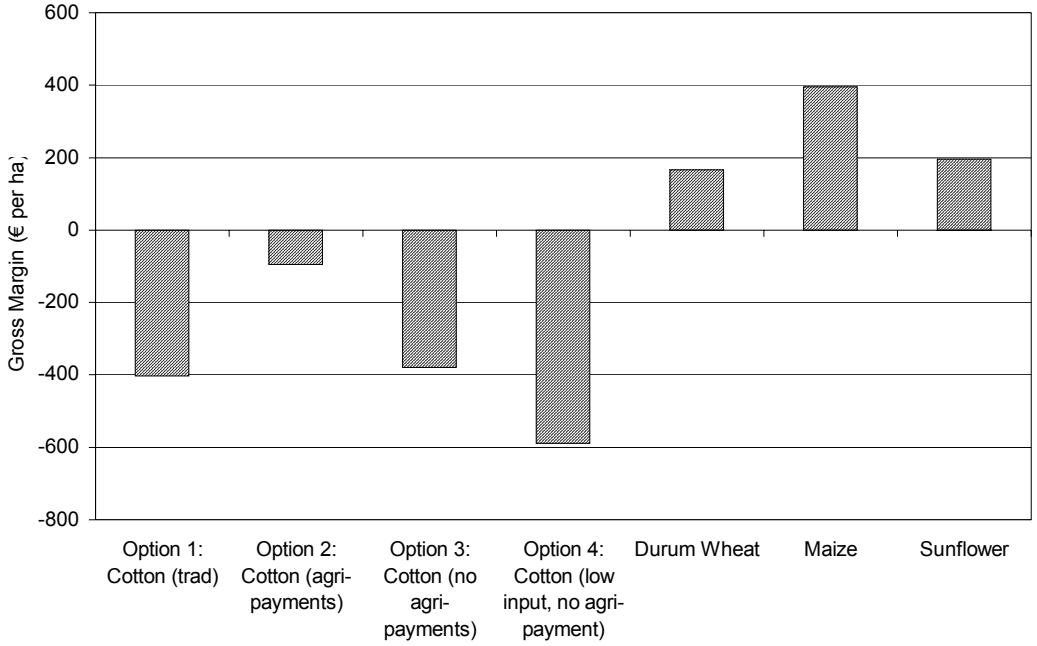
Following the reform, the quality of ginned cotton from the 2006 crop was poor compared to previous years in both Greece and Spain. Some diminution of quality was a result of weather in Greece, but the greatest impact came as a result of poorer farm management. In the view of ginners this is the result of the requirement that the coupled payment is made on boll opening rather than harvest. Lower fertiliser and irrigation applications in Spain resulted in shorter fibre length. In addition, farmers did not defoliate (apply a chemical to cause the leaves to fall off) before harvesting, which increased the amount of leaf impurities in the unginned cotton.

Another factor that has acted to reduce the quality of both Greek and Spanish cotton, but which is not related to the new regime, is the increasing use of stripper harvesters. The type of cotton varieties grown in both countries is the picker type, with more open bolls, that allows a spindle harvester to be used. The spindle harvester is gentler in handling the plant and the bolls, so that few impurities are incorporated into the unginned cotton. However, spindle harvesters are slow and very expensive, and are being replaced by stripper harvesters, which are faster and more affordable, but, because they literally beat the entire plant in the process of harvesting, far more plant matter – sticks, leaves, etc - are brought into the gin along with the unginned cotton.

FULL DECOUPLING

Under a fully decoupled system in Spain, where we assume that cereals are also fully decoupled, the margins for cotton turn negative and hence we would expect the area under cotton to fall to zero (Diagram 7.7).

Diagram 7.7: Spain, Gross Margins with Full Decoupling

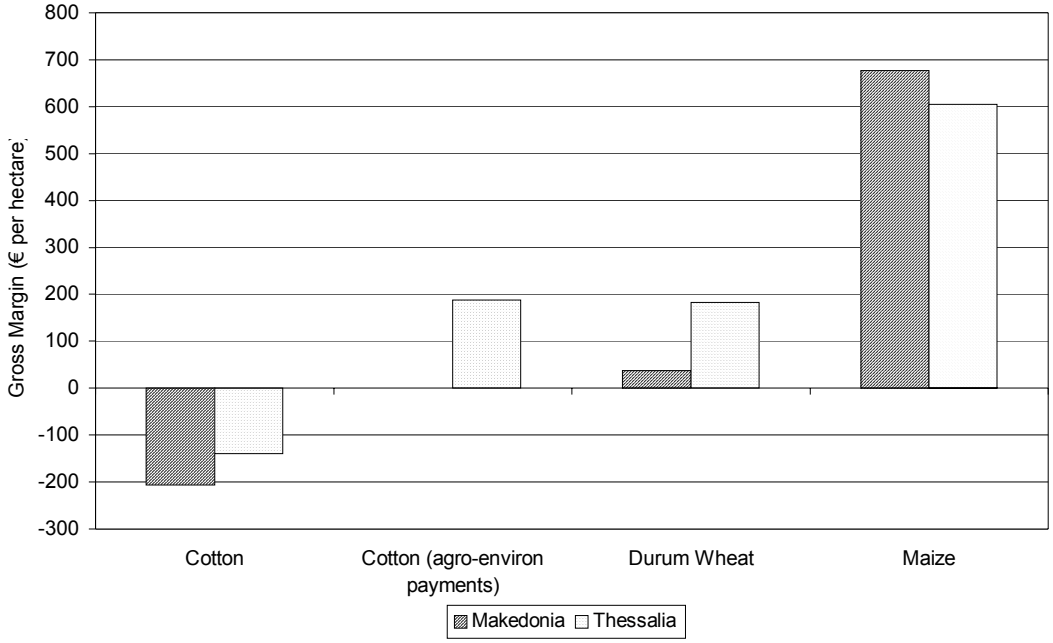


Source: LMC estimates

Under full decoupling in Greece, the margins for cotton turn negative except in the case where agri-environmental payments are being made. In the case where payments are not made, we would expect the the area under cotton to fall to zero.

Where agri-environmental payments are received, gross margins on cotton with full decoupling fall to an equivalent level to durum wheat; therefore we would expect this cotton production to continue (Diagram 7.8). Hence, under a fully decoupled scenario, the Greek cotton area falls back to 93,000 hectares.

Diagram 7.8: Greece, Gross Margin Cotton vis-à-vis Competing Crops, Full Decoupling



OBSERVATIONS

Protocol 4 established a Community support programme for cotton. According to the Protocol, the support system is intended "particularly to support cotton in the regions of the Community where it is important for the agricultural economy, to permit producers concerned to earn a fair income and to stabilise the market by structural improvements at the level of supply and marketing." With regard to the reform of the regime and options for change, our analysis suggests:

- The outcome of the reform, at least in the short run, has been markedly different in Greece and Spain. In Spain the area under cotton has contracted while in Greece it has been maintained. There are a number of reasons that account for the inertia among Greek producers. While our analysis is based on just one year's observations, in the longer term, we would expect to see the cotton area in Greece contract, in view of the higher gross margins for competing crops.

- The speed with which farmers switch between crops depends upon the gross margin, which is a function of both prices and costs. Our analysis in based on the prices that faced producers on planting in 2006. Over time, prices change. For instance, a rise in cereal prices relative to cotton (such as occurred between the time when planting decisions were being made for the 2006 and 2007 crops) would push gross margins further in favour of cereal production and the cotton area would be expected to contract. To assess changes to gross margins that occur as prices change, we have re-worked the analysis for the current system using FAPRI long term price projections for 2013/2014 as an example. In this case, cotton prices rise by 28%, durum wheat prices by 18%, maize prices rise by 48% and sunflower seed prices rise 12%. On this basis, the returns to maize move above those for other crops and one would expect some switching out of cotton to maize in both Greece and Spain.

- Under a fully decoupled system where a free market for cotton exists, the gross margin for cotton is negative in all but one case. Growers would be expected to switch to alternative crops and there would be much less cotton production in Europe. The only exception is the case where agri-environmental payments are made in Greece, which maintains a positive gross margin for cotton.

- Under the current system, in effect in 2006, gross margins on cotton are highest when agri-environmental payments are received. This is not the intention of the agri-environmental scheme. It suggests that the level at which these payments are set is too high. In Spain, the cost reductions have been greater than were previously anticipated, while in Greece, profitability estimates were based on margins under the old regime, a time when gross margins for cotton production were higher. This is distorting incentives and the level of such payments should be reviewed.

- In the absence of additional agri-environmental payments in Spain, the area under cotton would have fallen further in 2006. In this case, if we assume that farmers who had received the payment would have behaved in the same way as those who did not receive the payment, the area under cotton would have fallen to 33,800 hectares in 2006 (which compares with the actual planted area of 63,100 hectares that year).

- At present the scheme is based on the payment of the coupled payment on boll opening rather than harvest. For some producers in Spain, the optimal production decision is to move to a low input-low output system without harvesting. This option has lower costs per hectare and producers face less risk than under the other cotton options. Under this low intensity system, the incentives are for producers to reduce costs as much as possible in order to maximise the gross margin, since the trade-off between higher inputs and higher yields does not favour higher inputs. This option also holds the greatest risk for the ginning industry, as the greater the number of farmers who adopt this option, the less cotton available for ginning.

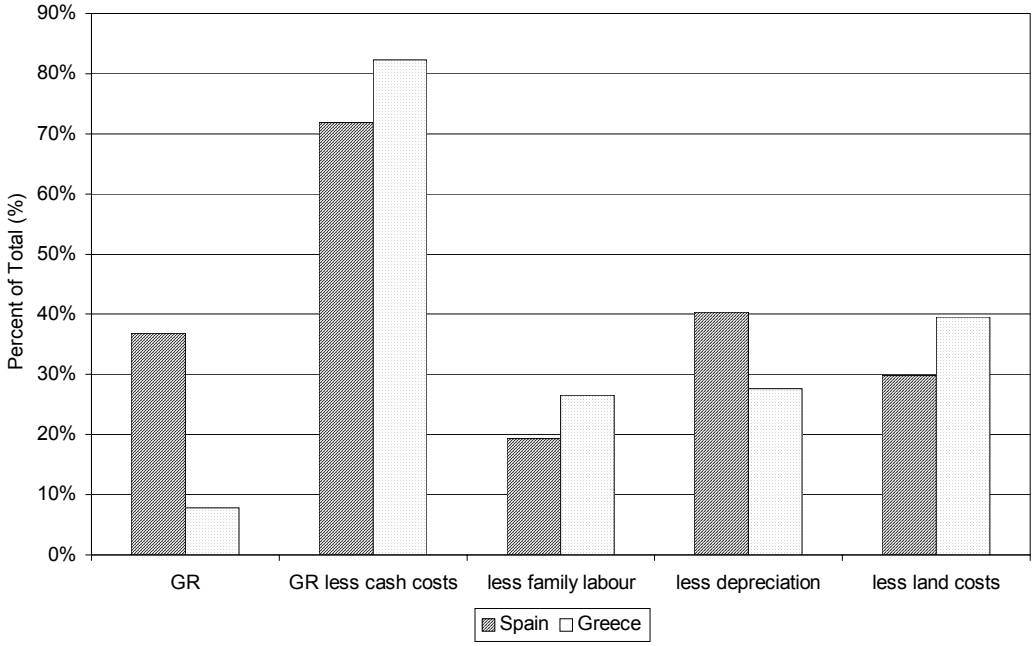
- The discovery that a low input-low output system without harvesting can be an optimal production response for some producers points to a sub-optimal incentive structure that does not lead to the maintenance of the ginning industry, which is essential to the long term viability of the industry. A system of coupled payments implies that cotton production is a desired objective, yet the payment on boll opening contradicts this view, as there is no requirement to harvest that cotton.

- Cotton is an important user of family labour. We have based our estimates of family labour time on FADN data, which is a source that provides data across countries and crops. However, there are concerns regarding the reliability of these data. This arises from the nature of family labour; for instance, if a farmer's sole employment is in farming, the full year's labour time will be allocated to it, while in reality only a proportion of labour time is actually be spent on agricultural tasks. Accordingly, the FADN estimates are likely to overestimate the amount of time spent on a particular crop and conversely underestimate the return to labour. In addition, there appear to be inconsistencies between the bases on which estimates were prepared of labour use for the same crops in different member states.

- Given the concerns over family labour time, we have used a methodology based on gross margins (the difference between revenue and variable costs). We have focussed on two measures: (a) the gross margin (excluding family labour) per

hectare, and (b) the return per hour of family labour (gross margin divided by the amount of family labour). Importantly, the reason for using gross margins (excluding family labour) is because this is the preferred method of measuring profitability citied by growers. In the questionnaire, farmers were asked "How do you calculate profits?" and could reply yes or no to the five categories shown in Diagram 7.9. Multiple sections were permitted. The most common response was gross revenue minus cash costs. Under 30% of farmers accounted for family labour in their analysis of profitability.

Diagram 7.9: Farmers' Calculation of Profitability



Note: GR = Gross Revenue

Source: Questionnaire Responses

- There is over-capacity in the ginning sector. This existed prior to the adoption of the reform, and was partly a consequence of the old cotton regime, but has been amplified by the reduction in production following the reform, particularly in Spain. Our calculations of capacity assume that total capacity remains constant, however, in reality, faced with such low levels of utilisation the sector would be expected to contract. In order to ensure the long term viability of the industry, ginning capacity needs to be rationalised. Measures could be considered to ease this transition.

Appendix 1: FADN Data Analysis

The FADN farm survey data, over the last five years, has received on average 1,050 responses from farmers growing cotton in Greece and 170 responses from Spanish farmers. The regional split of farmers in presented in Table A1.1.

Table A1.1: Farmers Growing Cotton FADN

NUTS2	NUTS3	1998	1999	2000	2001	2002	2003	2004
Greece								
Makedonia-Thraki	Dhrama	52	49	47	44	42	41	48
	Imathia	60	60	60	60	49	58	57
	Thessaloniki	78	75	85	74	70	74	78
	Kavala	34	24	24	17		8	11
	Kilkis	19	11	10	9	13	12	10
	Pella	23	22	23	24	27	30	38
	Pieria	12	14	14	13	12	16	18
	Serres	241	226	222	209	214	183	157
	Halkidhiki	14	12	14	11	7	6	5
	Evros	130	133	149	141	130	130	131
	Xanthi	30	30	10	15	15		15
	Rodhopi	78	52	52	34	33	30	28
Ipiros-Peloponis	Ilia	1	1	1	1	1	1	1
	Arta	4	4	5	4	2	3	3
	Preveza	8	3	3	3	2	2	3
Thessalia	Kardhitsa	176	95	140	141	121	151	124
	Larissa	143	145	145	140	137	126	130
	Magnisia	20	22	24	23	16	15	16
	Trikala	58	60	63	61	57	46	46
Sterea Ellas	Etolo-Akarnania	9	10	10	10	12	12	11
	Attiki-Pireas	1	1	1	1		1	1
	Boeotia	30	30	30	30	29	29	28
	Evia	11	13	15	14	14	12	13
	Fthiotis	35	39	34	7	8	8	7
Greece Total		**1,267**	**1,131**	**1,181**	**1,086**	**1,011**	**994**	**979**
Spain								
Murcia	Murcia	7	7	3			2	3
Andalucia	Cadiz	6	6	7	6	5	6	8
	Cordoba	56	12	84	53	53	14	14
	Granada		3	1	1	1	1	1
	Huelva	11		1	2			
	Jaen			4	4	4		
	Malaga		2	1				
	Sevilla	45	76	84	100	115	153	129
Spain Total		**125**	**106**	**185**	**166**	**178**	**176**	**155**

Source: FADN.

To simplify our analysis and to ensure there are enough observations in each grouping, we have divided the sample into three groups:

- 1. Makedonia-Thraki
- 2. Ipiros-Peloponis, Thessalia and Sterea Ellas

■ 3. Spain

STRUCTURE OF FARMS IN THE FADN SURVEY

Farm Size

For farms in the FADN survey, most observations, for both Spain and Greece, are in the 10 to 20 hectares range (Table A1.2). This average farm size is greater than one that is revealed from analysing the total number of holdings (as reported by Eurostat) (Diagrams A1.1 and A1.2).

Table A1.2: Average Farm Size FADN

	1998	1999	2000	2001	2002	2003	2004
Greece							
>5ha	203	180	181	155	139	130	108
5-10ha	427	378	390	329	304	287	276
10-20ha	432	389	402	383	337	323	324
<20ha	205	184	208	219	231	254	271
Spain							
>10ha	10	16	13	14	37	59	53
10-20ha	75	60	109	99	95	82	71
<20ha	40	30	63	53	46	35	31

Source: FADN.

Diagram A1.1: Greece Farm Size

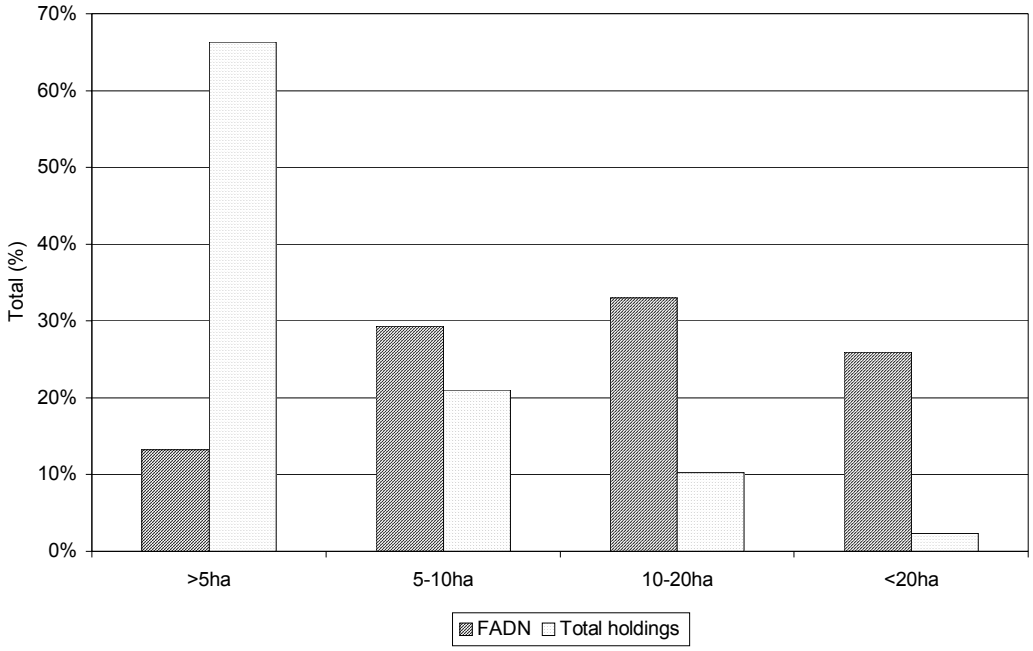
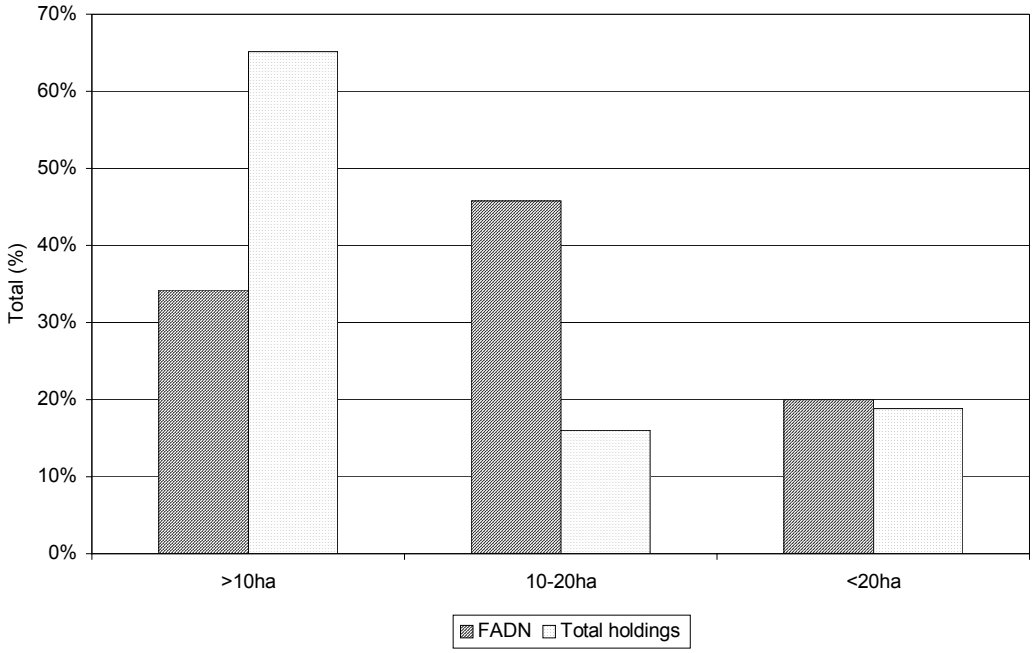


Diagram A1.2: Spain Farm Size



Average Cotton Area

The FADN sample that has been selected details all farms that grow cotton irrespective of the importance of cotton to the total holding. We have divided the sample according to farmers' dependence upon cotton, in terms of the area planted. The have established five groupings 100% cotton area, 75% to 99%, 74% to 50%, 49% to 25% and less than 25%. The observations in each grouping are presented in Table A1.2. In slightly over 50% of the farms, 50% of the farm area devoted to cotton (Table A1.4 and Diagram A1.3)

Having as large a sample as this, allows us to gain an insight into both cotton production costs and the costs for other crops. Farms where over 75% of the area is devoted to cotton provides value insights in to cotton production costs, while farms where under 25% of the area is devoted to cotton provides value insights into the production costs of other crops.

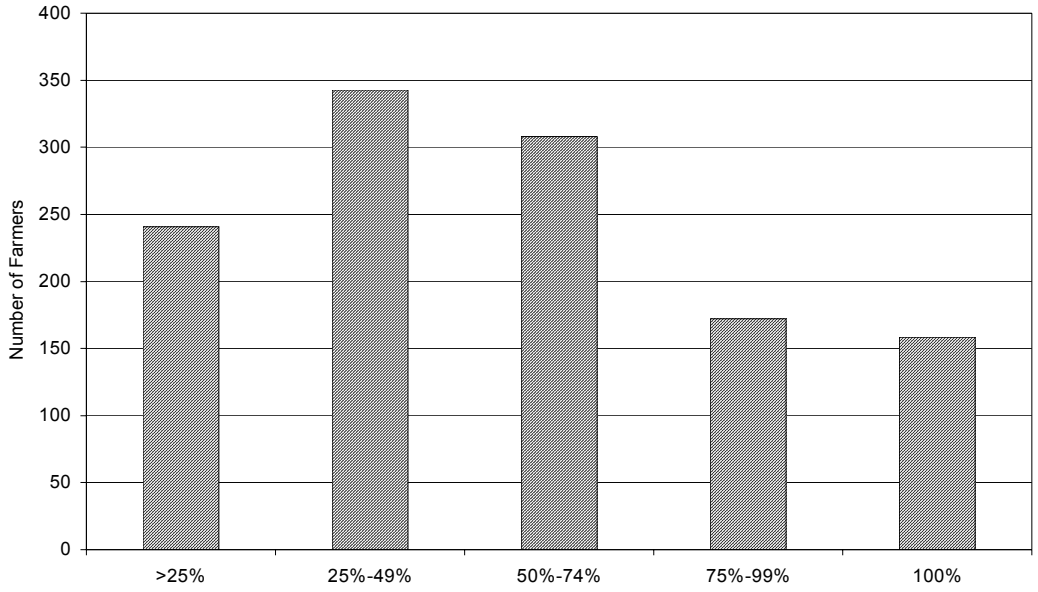
One of the difficulties in analysing FADN data is that the farmers reported in the sample can change each year. Analysing cohorts reduces this problem as it allows the same farmers to be analysed each year. This provides more consistent estimates. In Greece, the cohort size is large and 397 observations are common in each of the five years, while 525 observations appear in four or more of the years. This provides a very consistent set of data as will become apparent with the analysis of production costs. In Spain, this is not the case and the number of farmers whose results can be analysed over the full five years is only 8, while 57 farms appear in four or more of the years. This means that the observations can jump around considerably between years, for instance the number of farms with 100% cotton more than doubles in 2003. This is more a reflection of a change in the sample rather than a change in farm practises.

Table A1.3: Cotton Area as a % of Total Area

	1998	1999	2000	2001	2002	2003	2004	Average
Makedonia-Thraki								
>25%	207	171	189	182	199	170	186	29%
25%-49%	242	219	216	201	184	196	187	31%
50%-74%	176	159	178	143	114	104	116	21%
75%-99%	82	86	73	69	65	64	62	11%
100%	64	73	54	56	50	54	45	8%
Ipiros-Peloponi/Thessalia/Sterea Ellas								
>25%	37	46	43	43	42	36	36	10%
25%-49%	115	98	105	95	79	93	77	21%
50%-74%	128	116	158	144	134	125	121	33%
75%-99%	159	110	115	108	90	103	92	24%
100%	57	53	50	45	54	49	57	12%
Spain								
>25%	33	10	19	17	11	15	15	9%
25%-49%	62	35	84	66	64	36	31	33%
50%-74%	19	32	51	52	52	30	18	24%
75%-99%	1	7	5	4	2	2	7	2%
100%	10	22	26	27	49	93	84	32%

Source: FADN.

Diagram A1.3: Area under Cotton



Crops grown on Cotton Holdings

Table A1.4 provides details of the crops grown on farms which grow cotton. In Greece, the area is dominated by cereals, particularly durum wheat and maize. Sugarbeet is also important. In Spain, a similar picture emerges although sunflower is also important.

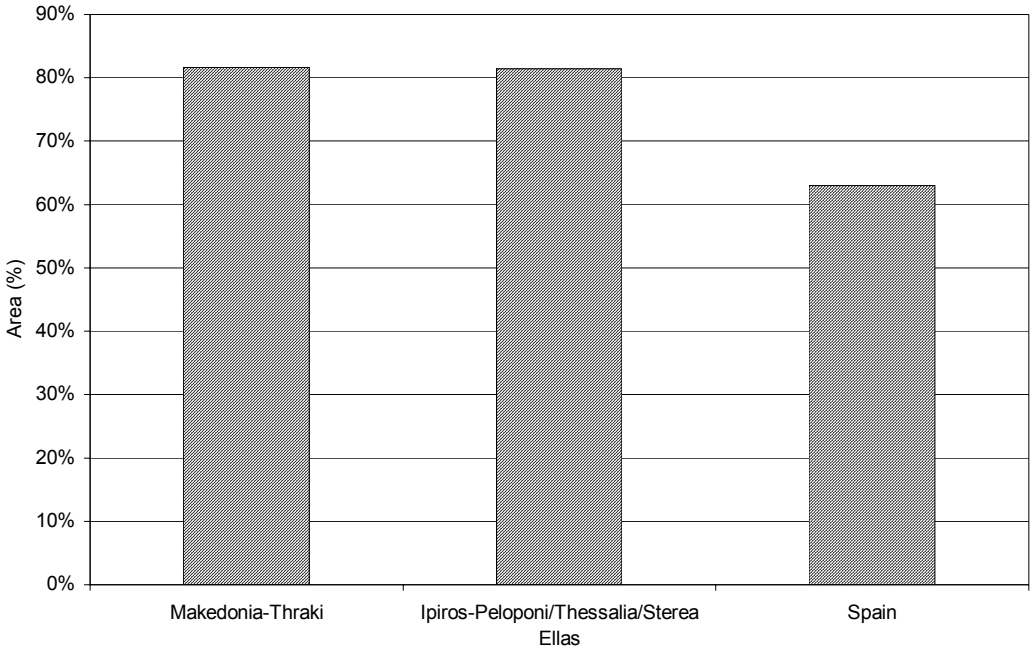
In Greece, cereals and cotton account for over 75% of the total farm area for 80% farmers in the sample over the last five years. In Spain, 60% of farmers fall into this category (Diagram A1.4). However, over the last two years this percentage has risen to 80% largely due to the change in sample.

Table A1.4: Crops Grown by Cotton Farmers

	1998	1999	2000	2001	2002	2003	2004
Major Crops							
Cotton	7,910	7,191	7,413	7,143	6,620	7,056	7,246
Durum Wheat	4,002	3,412	4,036	4,063	3,969	3,820	4,034
Maize	1,129	1,017	1,155	965	1,142	1,228	1,395
Other Cereals	951	710	772	855	639	651	732
Sunflower	356	345	227	155	164	92	24
Sugar beet	435	543	683	667	777	729	682
Other Crops							
Vegetables/Flowers	339	301	258	267	252	274	327
Vineyards	23	21	23	22	18	25	28
Permanent (including Olives)	334	315	323	289	266	264	290
Forage	403	373	456	411	406	455	498
Fallow	35	22	23	17	15	38	26
Set aside	112	214	176	189	247	324	272
Other Field	5	9	17	15	15	5	6
Other Oilseeds	356	345	227	155	164	92	24
Total Area	16,389	14,819	15,789	15,213	14,693	15,052	15,584
Spain							
Major Crops							
Cotton	913	1,440	2,179	2,016	2,113	2,213	2,022
Durum Wheat	358	922	800	390	284	274	478
Maize	210	48	356	333	271	181	152
Other Cereals	171	257	83	70	73	74	96
Sunflower	368	783	531	488	220	264	309
Sugar beet	228	360	506	467	481	329	305
Other Crops							
Vegetables/Flowers	76	55	120	118	44	49	76
Vineyards	0	0	0	0	0	0	12
Permanent (including Olives)	34	353	482	490	442	341	296
Forage	0	147	150	7	16	0	0
Fallow	7	50	16	3	0	3	0
Set aside	139	165	269	131	108	109	119
Other Field	148	83	165	148	162	81	206
Other Oilseeds	27	0	3	0	0	0	0
Total Area	2,679	4,662	5,661	4,661	4,214	3,917	4,070

Source: FADN.

Diagram A1.4: Cotton and Cereals combined as % of Total Farm Area



COTTON PRODUCTION COSTS

In order to determine cotton production costs, we analyse the farms that are growing 100% cotton, therefore all the costs of the farm operations can be attributed to cotton.

Makedonia-Thraki

Within the Makedonia/Thraki region, total variable costs (excluding unpaid labour) averaged €1,127 per hectare over the five year period, with fixed costs of €815 per hectare. Fixed costs are high due to the high levels of reported depreciation. The number of unpaid labour hours amounted 224. Assuming that the opportunity cost of this labour is the paid wage, total costs averaged €2,519 per hectare (Table 1.5 and Diagram A1.5).

Production costs are highest on the smallest farms, although yields are, on average, found to be higher on these farms (Table A1.6).

Table A1.5 Production Costs Makedonia-Thraki (€/hectare)

	2000	2001	2002	2003	2004
Variable Costs					
Seed	130.9	135.0	106.5	118.1	122.2
Fertiliser	167.6	163.9	148.9	143.6	154.5
Crop Protection	196.6	195.8	180.4	207.6	212.0
Other Specific Costs	24.1	19.0	27.9	33.5	29.0
Energy and Fuel	177.7	182.7	171.1	176.6	182.6
Contracted labour/services	293.8	272.0	273.9	262.8	263.4
Water/irrigation	95.6	106.9	107.9	102.9	108.3
Other Direct costs	12.8	14.3	9.4	12.1	13.2
Labour (paid)	38.6	42.9	47.8	62.7	83.4
Total Variable costs	1,137.8	1,132.5	1,073.9	1,119.8	1,168.6
Fixed Costs					
Machinery	52.3	55.2	48.3	50.6	56.3
Depreciation	443.0	469.5	537.8	517.2	572.0
Rent	191.6	215.6	276.1	281.2	273.6
Interest	11.2	7.9	10.9	11.0	12.0
Total Fixed Costs	698.1	748.2	873.1	860.1	913.9
Total Costs	1,835.9	1,880.7	1,947.0	1,980.0	2,082.5
Total Unpaid labour (hrs)	244.3	229.8	239.5	209.1	194.6
Average hourly wage	2.2	2.4	2.6	2.7	3.0
Total unpaid labour	543.9	550.9	611.7	569.3	593.0
Total cost including unpaid labour					
Variable Cost	1,627.3	1,628.3	1,624.4	1,632.2	1,702.3
Fixed Cost	752.5	803.3	934.3	917.1	973.2
Total Cost	2,379.8	2,431.6	2,558.6	2,549.3	2,675.5

Note: In deriving total costs it is assumed that 90% of unpaid labour is attributed to variable costs and 10% to fixed costs.

Source: FADN, LMC.

Diagram A1.5: Production Costs Makedonia-Thraki

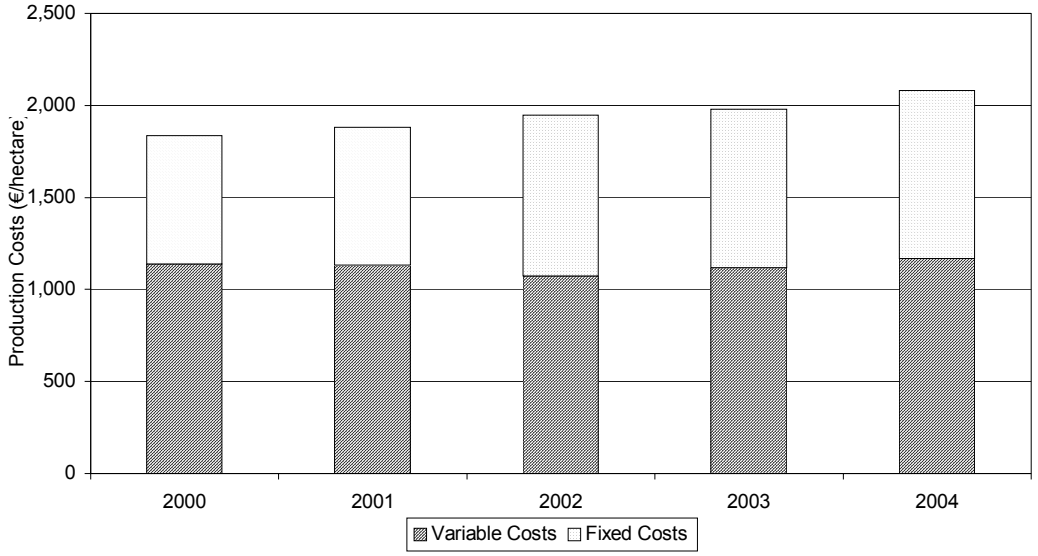


Table A1.6 Production Costs by Size Makedonia-Thraki (€/hectare)

	> 5 ha	5 - 10 ha	10 -20 ha	20+
Costs excluding Family Labour				
Variable	1,197	1,092	1,101	961
Fixed	906	823	738	650
Total	2,103	1,915	1,839	1,611
Costs including Family Labour				
Variable	1,862	1,585	1,435	1,304
Fixed	980	878	775	688
Total	2,842	2,463	2,210	1,992

Source: FADN, LMC.

Diagram A1.6: Production Costs by Size Makedonia-Thraki

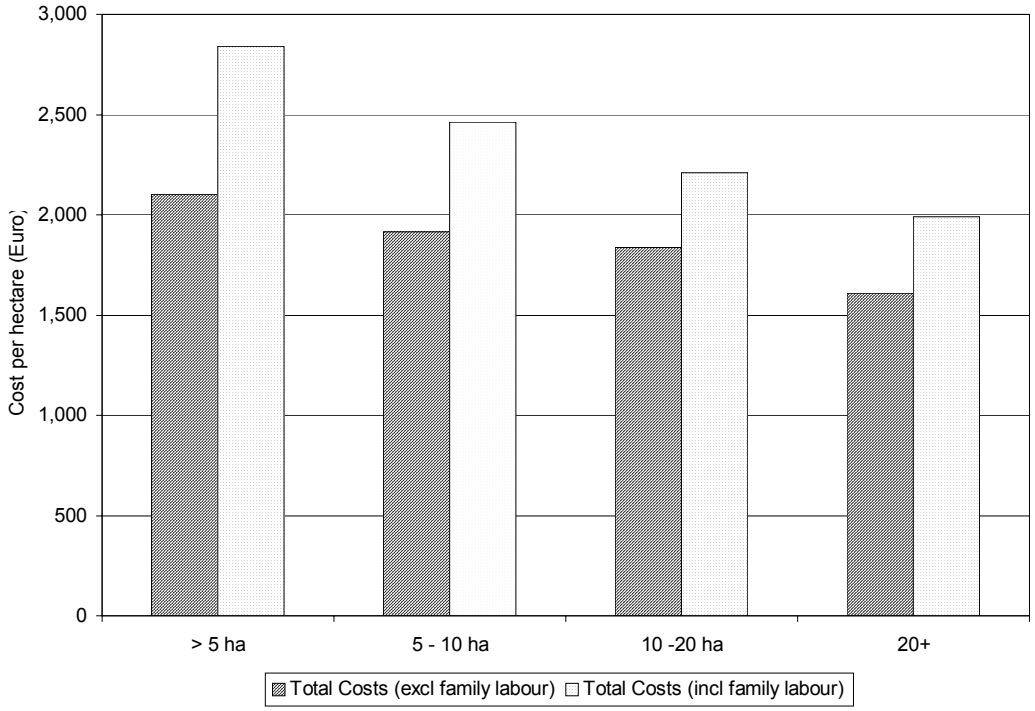


Table A1.7: Average Yields Makedonia-Thraki (Tonnes unginned cotton per hectare)

	2000	2001	2002	2003	2004
>5ha	3.38	3.71	3.66	2.69	3.29
5-10ha	3.24	3.52	3.47	2.65	3.17
10-20ha	3.10	3.40	3.34	2.58	3.09
<20ha	2.90	3.27	3.35	2.71	3.07

Source: FADN.

Ipiros-Peloponis, Thessalia and Sterea Ellas

Within the Ipiros-Peloponis, Thessalia and Sterea Ellas region, total variable costs (excluding unpaid labour) averaged €1,015 per hectare over the five year period, with fixed costs of €676 per hectare. The number of unpaid labour hours amounted 230. Assuming that the opportunity cost of this labour is the paid wage, total costs averaged €2,306 per hectare (Tables A1.8 to A1.10 and Diagrams A1.7 and A1.8).

Table A1.8 Production Costs Ipiros-Peloponis, Thessalia and Sterea Ellas (€/hectare)

	2000	2001	2002	2003	2004	Average
Variable Costs						
Seed	142.0	152.7	155.4	162.5	201.7	162.9
Fertiliser	144.5	146.0	160.4	149.5	163.9	152.9
Crop Protection	90.8	88.7	106.6	116.2	132.8	107.0
Other Specific Costs	20.4	16.7	17.0	9.2	11.8	15.0
Energy and Fuel	199.3	197.4	223.1	249.6	279.8	229.8
Contracted labour/services	269.5	283.4	264.9	244.0	247.5	261.9
Water/irrigation	26.4	24.5	38.5	41.8	48.4	35.9
Other Direct costs	13.3	12.3	20.1	33.9	17.8	19.5
Labour (paid)	31.0	23.7	30.2	35.7	30.3	30.2
Total Variable costs	937.3	945.3	1,016.1	1,042.4	1,134.1	1,015.0
Fixed Costs						
Machinery	39.3	44.6	45.8	43.7	37.6	42.2
Depreciation	370.3	349.3	389.0	384.0	339.0	366.3
Rent	205.7	229.6	254.2	275.2	253.5	243.6
Interest	57.7	18.6	18.1	15.6	8.4	23.7
Total Fixed Costs	673.1	642.1	707.1	718.6	638.6	675.9
Total Costs	1,610.4	1,587.4	1,723.2	1,761.0	1,772.6	1,690.9
Total Unpaid labour (hrs)	231.3	239.6	248.2	210.0	220.3	229.9
Average hourly wage	2.2	2.4	2.6	3.0	3.1	2.7
Total unpaid labour	516.7	582.1	656.9	640.0	682.5	615.6
Total cost including unpaid labour						
Variable Cost	1,402.3	1,469.2	1,607.4	1,618.4	1,748.3	1,569.1
Fixed Cost	724.7	700.3	772.8	782.6	706.8	737.4
Total Cost	2,127.1	2,169.5	2,380.1	2,400.9	2,455.2	2,306.6

Note: In deriving total costs it is assumed that 90% of unpaid labour is attributed to variable costs and 10% to fixed costs.

Source: FADN, LMC.

Diagram A1.7: Production Costs Ipiros-Peloponis, Thessalia and Sterea Ellas

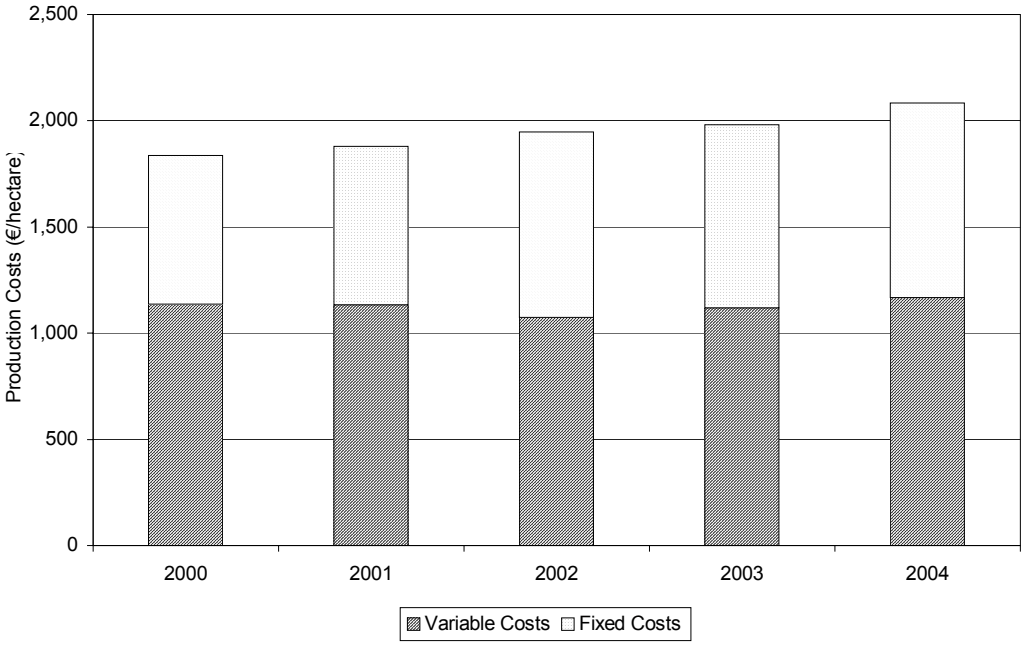


Table A1.9 Production Costs by Size Ipiros-Peloponis, Thessalia and Sterea Ellas
(€/hectare)

	> 5 ha	5 - 10 ha	10 -20 ha	20+
Costs excluding Family Labour				
Variable	1,007	964	1,028	1,345
Fixed	658	649	711	880
Total	1,665	1,613	1,740	2,225
Costs including Family Labour				
Variable	1,883	1,460	1,371	1,542
Fixed	755	704	750	902
Total	2,638	2,164	2,120	2,443

Source: FADN.

Diagram A1.8 Production Costs by Size Ipiros-Peloponis, Thessalia and Sterea Ellas

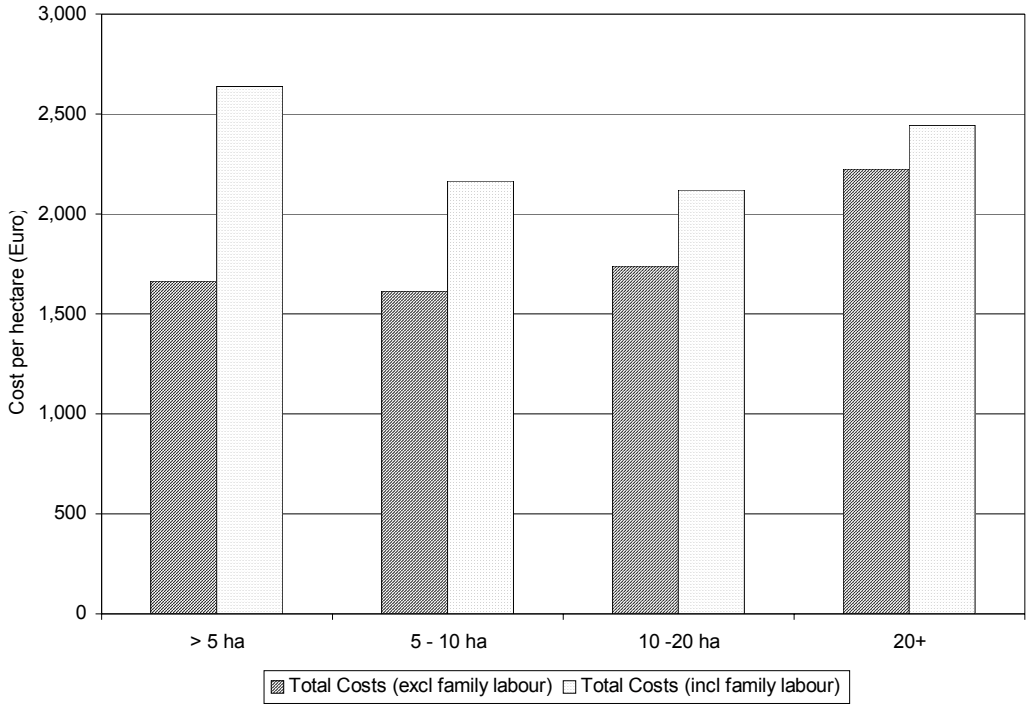


Table A1.10: Average Yields Ipiros-Peloponis, Thessalia and Sterea Ellas (Tonnes unginned cotton per hectare)

	2000	2001	2002	2003	2004
>5ha	3.02	3.32	3.45	3.13	3.34
5-10ha	3.30	3.63	3.61	3.21	3.42
10-20ha	3.33	3.59	3.62	3.21	3.50
<20ha	3.37	3.70	3.86	3.41	3.57

Source: FADN.

Spain

In Spain, total variable costs (excluding unpaid labour) averaged €1,355 per hectare over the five year period, with fixed costs of €420 per hectare. However, there is considerable variation in the cost figures between years, largely due to the changing sample. In 2003 and 2004 costs were considerably higher. In these two years the sample size was larger (Table 1.2) and the higher cost figures are consistent with data available from other sources. For instance the private sector database, puts variable costs around €2,300 per hectare in 2002. This is consistent with the FADN data once an allowance has been made for family labour. We base the rest of our analysis on the 2003 and 2004 data as these appear to provide a more accurate reflection of the state of the industry. Over these two years, total variable costs (excluding unpaid labour) averaged €1,647 per hectare with fixed costs of €322 per hectare. The number of unpaid labour hours amounted 322. Assuming that the opportunity cost of this labour is

the paid wage, total costs averaged €2,960 per hectare (Tables A1.11 to A1.13 and Diagrams A1.9 and A1.10).

Table A1.11: Production Costs Spain (€/hectare)

	2000	2001	2002	2003	2004
Variable Costs					
Seed	119.9	206.7	202.1	120.6	130.3
Fertiliser	146.7	189.3	286.3	230.4	253.6
Crop Protection	163.5	165.4	211.8	452.1	325.6
Other Specific Costs	54.5	61.4	62.0	72.6	71.9
Energy and Fuel	138.2	116.6	92.5	59.0	78.7
Contracted labour/services	196.8	152.7	162.7	308.6	464.8
Water/irrigation	93.4	73.6	76.3	165.4	237.2
Other Direct costs	27.4	46.2	46.5	55.6	94.2
Labour (paid)	85.2	94.7	113.6	96.3	76.6
Total Variable costs	1,025.6	1,106.6	1,253.8	1,560.6	1,732.8
Fixed Costs					
Machinery	46.5	54.2	66.4	44.5	58.8
Depreciation	261.1	121.9	87.1	75.7	61.8
Rent	180.3	255.5	323.7	199.7	188.2
Interest	25.7	20.4	15.8	9.1	5.1
Total Fixed Costs	513.6	452.0	493.0	329.1	313.9
Total Costs	1,539.2	1,558.7	1,746.8	1,889.7	2,046.7
Total Unpaid labour (hrs)	107.0	93.1	110.9	191.8	182.1
Average hourly wage	5.1	5.4	5.8	5.2	5.4
Total unpaid labour	542.3	504.9	647.4	994.6	990.5
Total cost including unpaid labour					
Variable Cost	1,513.7	1,561.1	1,836.5	2,455.7	2,624.3
Fixed Cost	567.8	502.5	557.7	428.5	412.9
Total Cost	2,081.5	2,063.6	2,394.2	2,884.3	3,037.2

Note: In deriving total costs it is assumed that 90% of unpaid labour is attributed to variable costs and 10% to fixed costs.

Source: FADN, LMC.

Diagram A1.9: Production Costs Spain

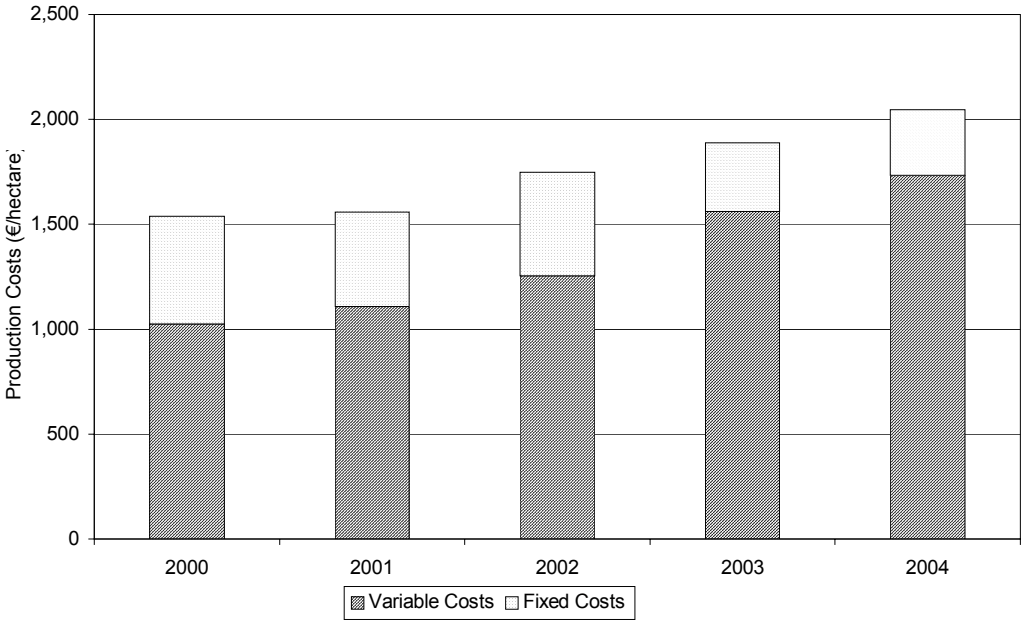


Table A1.12 Production Costs by Size Spain (€/hectare)

	> 10 ha	10 -20 ha	20+
Costs excluding Family Labour			
Variable	1,507	1,271	1,206
Fixed	398	396	695
Total	1,905	1,667	1,901
Costs including Family Labour			
Variable	2,392	1,845	1,543
Fixed	496	460	732
Total	2,888	2,305	2,275

Source: FADN.

Diagram A1.10: Production Costs by Size Spain

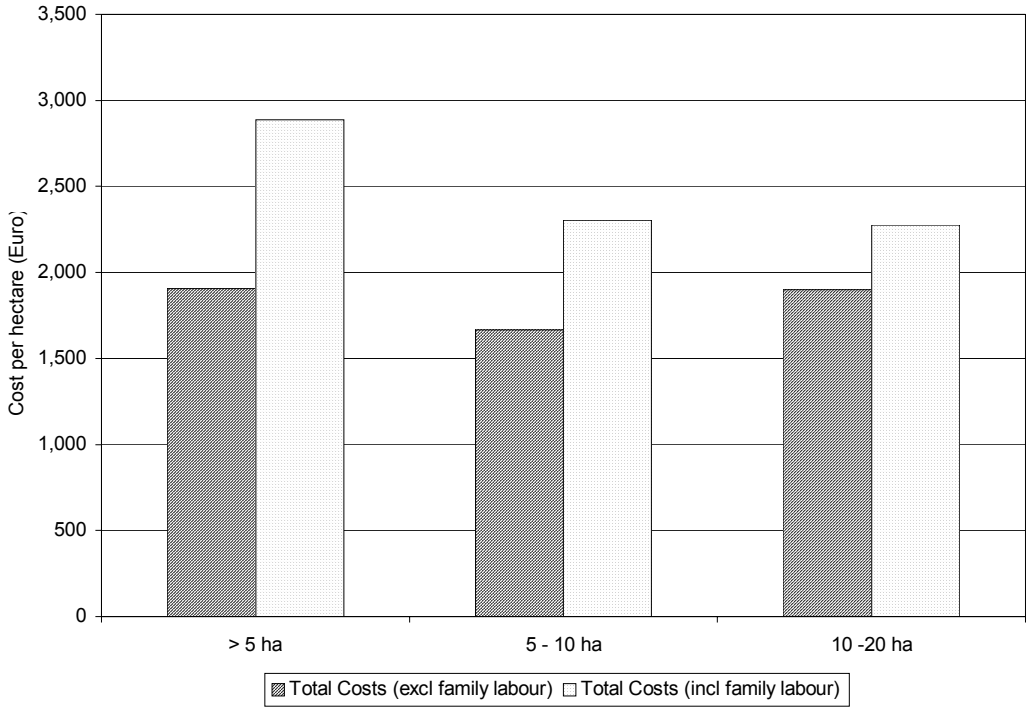


Table A1.13: Average Yields Spain (tonnes unginned cotton per hectare)

	2000	2001	2002	2003	2004
<10ha	3.00	3.44	3.27	3.47	3.87
10-20ha	3.56	3.41	3.35	3.18	4.00
>20ha	4.92	3.59	3.57	3.38	4.20

Source: FADN.

Importance of Family/Unpaid Labour

The FADN data suggest that the importance of family/unpaid labour declines as the farm size increases. In Makedonia-Thraki cotton accounts for an average of 287 hours per hectare per annum on the smallest farms, and this reduces to 150 hours per hectare on the largest farms. In Ipiros-Peloponi/Thessalia/Sterea Ellas, the number of labour hours per hectare falls from 362 to 81, while in Spain the number of labour hours worked per hectare falls from 183 to 69.

Table A1.14: Unpaid Labour Hours (hours per hectare)

	2000	2001	2002	2003	2004	Average
Makedonia-Thraki						
>5ha	293	292	308	282	259	287
5-10ha	226	215	219	211	193	213
10-20ha	163	134	160	105	156	144
<20ha	236	70	200	121	122	150
Ipiros-Peloponi/Thessalia/Sterea Ellas						
>5ha	354	354	399	332	371	362
5-10ha	197	196	208	210	209	204
10-20ha	135	142	150	121	158	141
<20ha	79	80	62	95	87	81
Spain						
>10ha	166	125	151	238	236	183
10-20ha	94	83	102	162	151	119
<20ha	61	61	73	81	71	69

Source: FADN.

Appendix 2: FADN Data Alternative Crops

In order to select the crops to be picked as possible alternatives to cotton a selection was made form the crops that are already being grown by cotton producers. Table A2.1 below summarises the FADN data on the crops being grown by farmers growing cotton.

Table A2.1: Crops Grown by Cotton Farmers

	1998	1999	2000	2001	2002	2003	2004
Major Crops							
Cotton	7,910	7,191	7,413	7,143	6,620	7,056	7,246
Durum Wheat	4,002	3,412	4,036	4,063	3,969	3,820	4,034
Maize	1,129	1,017	1,155	965	1,142	1,228	1,395
Other Cereals	951	710	772	855	639	651	732
Sunflower	356	345	227	155	164	92	24
Sugar beet	435	543	683	667	777	729	682
Other Crops							
Vegetables/Flowers	339	301	258	267	252	274	327
Vineyards	23	21	23	22	18	25	28
Permanent (including Olives)	334	315	323	289	266	264	290
Forage	403	373	456	411	406	455	498
Fallow	35	22	23	17	15	38	26
Set aside	112	214	176	189	247	324	272
Other Field	5	9	17	15	15	5	6
Other Oilseeds	356	345	227	155	164	92	24
Total Area	16,389	14,819	15,789	15,213	14,693	15,052	15,584
Spain							
Major Crops							
Cotton	913	1,440	2,179	2,016	2,113	2,213	2,022
Durum Wheat	358	922	800	390	284	274	478
Maize	210	48	356	333	271	181	152
Other Cereals	171	257	83	70	73	74	96
Sunflower	368	783	531	488	220	264	309
Sugar beet	228	360	506	467	481	329	305
Other Crops							
Vegetables/Flowers	76	55	120	118	44	49	76
Vineyards	0	0	0	0	0	0	12
Permanent (including Olives)	34	353	482	490	442	341	296
Forage	0	147	150	7	16	0	0
Fallow	7	50	16	3	0	3	0
Set aside	139	165	269	131	108	109	119
Other Field	148	83	165	148	162	81	206
Other Oilseeds	27	0	3	0	0	0	0
Total Area	2,679	4,662	5,661	4,661	4,214	3,917	4,070

Source: FADN.

In Greece, the area is dominated by cereals, particularly durum wheat and maize. Sugarbeet is also important. In Spain, a similar picture emerges although sunflower is also important. On the basis of this, we have considered:

- Durum wheat;

- Maize; and
- Sunflower in Spain

Sugarbeet is excluded since farmers cannot increase beet output due to the existence of quotas. We have also considered fruit and vegetables.

In order to calculate production costs for alternative crops, a second request was made for FADN data for producers specialising in these crops. In the case of durum wheat, maize and sunflower, this data is for producers where the crop accounts for 50% of total revenue, for fruit and vegetables the crop accounted for 70% of total revenues. In order to calculate cost estimates for fruit and vegetables, we have summed the FADN categories for vegetables, fruit and citrus fruit.

THE SAMPLE

Durum Wheat

FADN sample is for approaching 200 farms, with the majority in Makedonia-Thraki (Table A2.2). The average farm size in Greece was in the order of 30 hectares, while in Spain the average size was 88 hectares (Table A2.3 and Diagram A2.1). In terms of area, for the majority of farms durum wheat accounted for between 75% to 100% of the total farm area (Table A2.4)

Table A2.2: Farms Specialising in Durum Wheat Production

	1998	1999	2000	2001	2002	2003	2004
Makedonia-Thraki	95	105	118	133	118	103	126
Thessalia Sterea Ellas	27	28	27	24	18	24	19
Spain	96	24	37	57	41	69	37
Total	218	157	182	214	177	196	182

Source: FADN.

Table A2.3: Average Size of Farms Specialising in Durum Wheat Production

	1998	1999	2000	2001	2002	2003	2004	Average
Makedonia-Thraki	28.4	29.1	26.3	30.3	31.0	37.1	31.8	31.3
Thessalia Sterea Ellas	18.3	25.9	20.7	21.8	29.6	32.6	36.7	28.3
Spain	91.1	69.3	84.3	126.8	92.4	63.8	77.3	88.9

Source: FADN.

Diagram A2.1: Average Size of Farms Specialising in Durum Wheat

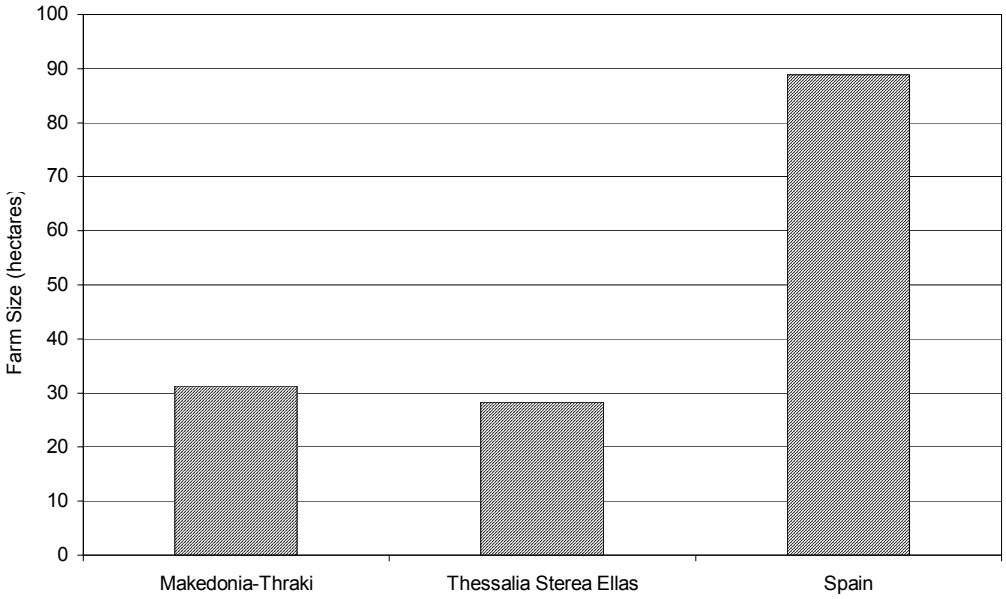


Table A2.4: Area Under Durum Wheat for Farms Specialising in Durum Wheat Production

Region	Area under Durum Wheat	1998	1999	2000	2001	2002	2003	2004
Makedonia-Thraki	25%-50%	2.0	3.0	7.0	3.0	4.0	4.0	2.0
	50%-75%	29.0	27.0	33.0	28.0	25.0	10.0	14.0
	75%100%	64.0	75.0	78.0	102.0	89.0	89.0	110.0
Thessalia Sterea Ellas	25%-50%	1.0					1.0	
	50%-75%	18.0	12.0	14.0	5.0	11.0	13.0	8.0
	75%100%	8.0	16.0	13.0	19.0	7.0	10.0	11.0
Spain	>25%	6.0	1.0		3.0		2.0	2.0
	25%-50%	33.0	10.0	19.0	22.0	10.0	11.0	7.0
	50%-75%	33.0	8.0	15.0	26.0	22.0	19.0	13.0
	75%100%	24.0	5.0	3.0	6.0	9.0	37.0	15.0

Source: FADN.

Maize

FADN sample averages 150 farms per annum, with the majority in Makedonia-Thraki (Table A2.5). The average farm size in Greece was in the order of 10 hectares, while in Spain the average size was 24 hectares (Table A2.6 and Diagram A2.2). In terms of area, for the majority of farms durum wheat accounted for between 75% to 100% of the total farm area (Table A2.7)

Table A2.5: Farms Specialising in Maize Production

	1998	1999	2000	2001	2002	2003	2004
Makedonia-Thraki	111	105	75	91	70	103	117
Thessalia Sterea Ellas	58	28	36	37	35	43	45
Spain	31	6	25	35	29	5	8
Total	200	139	136	163	134	151	170

Source: FADN.

Table A2.6: Average Size of Farms Specialising in Maize Production

	1998	1999	2000	2001	2002	2003	2004	Average
Makedonia-Thraki	10.0	29.1	10.8	11.0	13.7	14.9	16.9	13.5
Thessalia Sterea Ellas	8.6	25.9	8.3	8.1	8.4	9.3	8.0	8.4
Spain	44.4	16.7	27.7	22.8	21.7	36.0	8.6	23.4

Source: FADN.

Diagram A2.2: Average Size of Farms Specialising in Maize

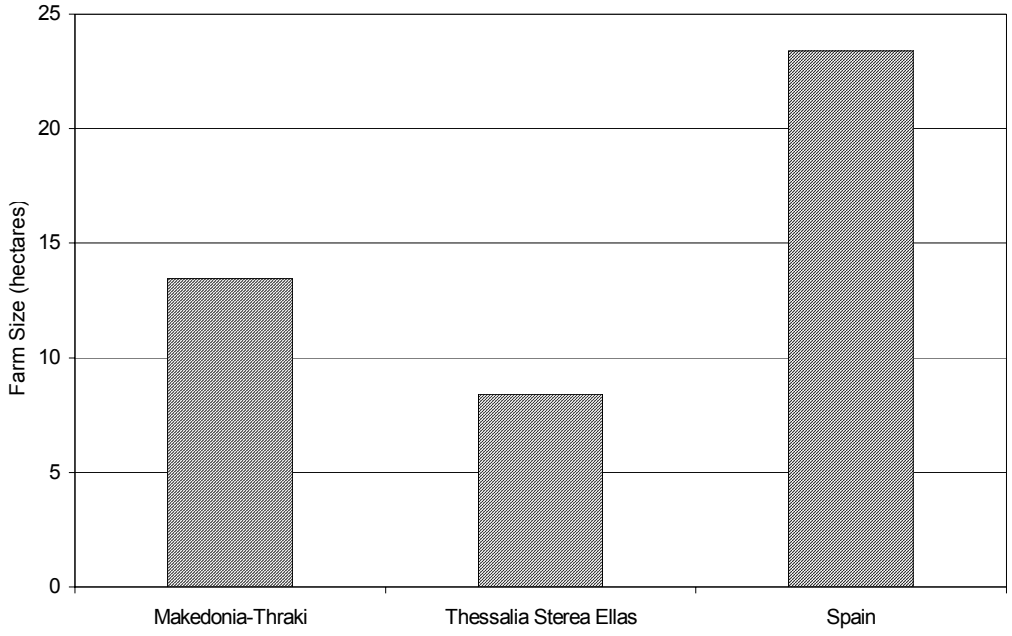


Table A2.7: Area Under Maize for Farms Specialising in Maize Production

Region	Area under Durum Wheat	1998	1999	2000	2001	2002	2003	2004
Makedonia-Thraki	>25%	3	105	3	4	1	7	7
	25%-50%	55		20	21	22	24	26
	50%-75%	32		34	39	30	42	52
	75%100%	21		18	27	17	30	32
Thessalia Sterea Ellas	>25%		28	1		2		2
	25%-50%	14		6	6	7	11	9
	50%-75%	17		15	16	14	14	16
	75%100%	27		14	15	12	18	18
Spain	>25%	3		2				
	25%-50%	13		13	11	7	1	
	50%-75%	7	3	8	5	4		
	75%100%	8	3	2	19	18	4	8

Source: FADN.

Sunflower

For sunflower, we have only considered Spain. The Spanish FADN sample averages 21 farms per annum (Table A2.8). The average farm size was in the order of 74 hectares (Table A2.9). In terms of area, for the majority of farms sunflowers accounted for between 25% to 50% of the total farm area (Table A2.10)

Table A2.8: Farms Specialising in Sunflower Production

	1998	1999	2000	2001	2002	2003	2004
Spain	68	29	23	21	31	15	15

Source: FADN.

Table A2.9: Average Size of Farms Specialising in Sunflower Production

	1998	1999	2000	2001	2002	2003	2004
Spain	90	123	132	61	55	39	82

Source: FADN.

Table A2.10: Area Under Sunflower for Farms Specialising in Sunflower Production

Area under Sunflower	1998	1999	2000	2001	2002	2003	2004
>25%	2	3	1	1			1
25%-50%	25	14	12	11	23	8	10
50%-75%	30	9	7	6	4	4	4
75%100%	11	3	3	3	4	3	

Source: FADN.

PRODUCTION COSTS

In order to calculate costs, we have taken farms with an area of between 75% and 100% of the particular crop. Costs are presented by country; for Greece durum wheat, and maize and for Spain durum wheat, maize and sunflower.

Durum Wheat

Table A2.14: Durum Wheat Production Costs, Makedonia-Thraki

	2000	2001	2002	2003	2004	FADN Average
Variable Costs						
Seed	70	76	75	73	70	73
Fertiliser	99	97	93	97	102	98
Crop Protection	41	43	38	41	48	42
Other Specific Costs	9	9	8	8	9	9
Energy and Fuel	54	53	50	52	51	52
Contracted labour/services	75	70	76	58	56	67
Water/irrigation	3	2	1	2	2	2
Other Direct costs	6	6	6	8	9	7
Labour (paid)	8	10	4	10	13	9
Total Variable costs	364	367	351	348	360	358
Fixed Costs						
Machinery	17	21	17	19	21	19
Depreciation	164	160	172	155	165	163
Rent	103	101	104	105	110	105
Interest	11	5	10	3	1	6
Total Fixed Costs	294	288	302	283	297	293
Total Costs	658	655	653	631	657	651
Total Unpaid labour (hrs)	78	79	76	89	79	80
Average hourly wage	2	2	3	3	3	3
Total unpaid labour	174	190	195	242	240	208
Total cost including unpaid labour	.					
Variable Cost	521	539	526	566	577	546
Fixed Cost	312	307	322	307	321	314
Total Cost	833	846	848	873	897	859

Source: FADN.

Table A2.15: Durum Wheat Production Costs, Thessalia/Sterea Ellas

	2000	2001	2002	2003	2004	FADN Average
Variable Costs						
Seed	65	74	76	62	80	71
Fertiliser	115	105	127	107	123	115
Crop Protection	29	33	54	40	41	40
Other Specific Costs	2	1	10	2	3	3
Energy and Fuel	52	59	41	34	43	46
Contracted labour/services	59	72	53	58	70	62
Water/irrigation	2	1	2	0	1	1
Other Direct costs	9	7	6	-	1	4
Labour (paid)	9	12	30	14	25	18
Total Variable costs	340	364	399	317	387	361
Fixed Costs						
Machinery	18	18	30	21	13	20
Depreciation	147	139	91	144	118	128
Rent	64	54	106	96	122	89
Interest	-	3	-	2	-	1
Total Fixed Costs	229	214	227	264	254	237
Total Costs	569	578	625	581	641	599
Total Unpaid labour (hrs)	123	129	90	92	98	106
Average hourly wage	2	2	3	3	3	3
Total unpaid labour	275	313	237	281	303	282
Total cost including unpaid labour	.					
Variable Cost	588	646	612	571	660	615
Fixed Cost	256	246	250	292	284	266
Total Cost	844	892	862	862	944	881

Source: FADN.

Table A2.16: Durum Wheat Production Costs, Spain

	2000	2001	2002	2003	2004	FADN Average
Variable Costs						
Seed	45	69	96	66	58	67
Fertiliser	53	83	70	103	124	87
Crop Protection	26	33	47	41	38	37
Other Specific Costs	2	1	-	2	1	1
Energy and Fuel	49	43	65	17	47	44
Contracted labour/services	19	51	15	47	33	33
Water/irrigation	-	24	35	-	-	12
Other Direct costs	13	23	28	11	32	21
Labour (paid)	62	19	72	10	13	35
Total Variable costs	269	346	426	298	346	337
Fixed Costs						
Machinery	16	5	16	7	41	17
Depreciation	17	57	80	24	23	40
Rent	33	30	82	54	14	43
Interest	-	-	11	-	-	2
Total Fixed Costs	66	92	189	84	78	102
Total Costs	335	438	615	382	424	439
Total Unpaid labour (hrs)	49	94	60	148	134	97
Average hourly wage	5	5	6	5	5	5
Total unpaid labour	250	509	349	770	729	521
Total cost including unpaid labour						
Variable Cost	494	804	740	991	1,002	806
Fixed Cost	91	143	224	161	150	154
Total Cost	585	947	963	1,152	1,152	960

Source: FADN.

Maize

Table A2.17: Maize Production Costs, Makedonia-Thraki

	2000	2001	2002	2003	2004	Average
Variable Costs						
Seed	147	121	150	155	151	145
Fertiliser	237	169	223	216	228	215
Crop Protection	135	87	122	134	144	124
Other Specific Costs	12	11	27	40	32	24
Energy and Fuel	145	134	157	194	166	159
Contracted labour/services	130	139	136	142	129	135
Water/irrigation	79	67	66	75	55	68
Other Direct costs	9	10	12	6	8	9
Labour (paid)	18	4	44	10	46	24
Total Variable costs	912	743	937	972	959	905
Fixed Costs						
Machinery	41	32	26	39	48	37
Depreciation	349	307	425	393	343	363
Rent	212	194	190	174	142	182
Interest	21	28	12	2	1	13
Total Fixed Costs	623	561	653	607	534	596
Total Costs	1,536	1,303	1,590	1,579	1,494	1,500
Total Unpaid labour (hrs)	253	218	200	190	194	211
Average hourly wage	2	2	3	3	3	3
Total unpaid labour	562	522	511	518	591	541
Total cost including unpaid labour						
Variable Cost	1,418	1,212	1,396	1,438	1,491	1,391
Fixed Cost	679	613	704	659	593	650
Total Cost	2,098	1,825	2,101	2,097	2,084	2,041

Source: FADN.

Table A2.18: Maize Production Costs, Thessalia/Sterea Ellas

	2000	2001	2002	2003	2004	Average
Variable Costs						
Seed	132	143	132	135	125	133
Fertiliser	250	261	246	260	261	256
Crop Protection	73	67	82	71	89	76
Other Specific Costs	46	37	53	39	35	42
Energy and Fuel	102	67	86	118	131	100
Contracted labour/services	203	207	173	176	168	186
Water/irrigation	111	108	100	98	99	103
Other Direct costs	11	11	9	7	12	10
Labour (paid)	7	9	23	24	35	20
Total Variable costs	935	911	904	929	954	927
Fixed Costs						
Machinery	41	36	33	23	33	33
Depreciation	208	177	243	251	307	237
Rent	113	76	227	214	184	163
Interest	14	5	-	2	2	4
Total Fixed Costs	376	294	503	490	526	438
Total Costs	1,312	1,205	1,407	1,419	1,479	1,364
Total Unpaid labour (hrs)	434	513	424	407	446	445
Average hourly wage	2	2	3	3	3	3
Total unpaid labour	969	1,247	1,121	1,239	1,381	1,192
Total cost including unpaid labour						
Variable Cost	1,808	2,034	1,913	2,044	2,197	1,999
Fixed Cost	473	419	615	614	664	557
Total Cost	2,281	2,453	2,528	2,658	2,861	2,556

Source: FADN.

Table A2.19: Maize Production Costs, Spain

	2000	2001	2002	2003	2004	Average
Variable Costs						
Seed	125	155	155	224	190	170
Fertiliser	99	215	265	179	200	192
Crop Protection	36	114	100	103	59	83
Other Specific Costs	-	-	-	-	-	-
Energy and Fuel	35	69	76	48	102	66
Contracted labour/services	143	46	63	170	215	127
Water/irrigation	32	79	54	103	172	88
Other Direct costs	26	30	34	157	130	75
Labour (paid)	32	84	100	165	118	100
Total Variable costs	529	792	847	1,150	1,185	901
Fixed Costs						
Machinery	1	44	71	61	64	48
Depreciation	141	82	67	60	77	85
Rent	214	16	16	74	228	110
Interest	4	1	-	-	15	4
Total Fixed Costs	360	142	155	195	384	247
Total Costs	889	934	1,002	1,345	1,569	1,148
Total Unpaid labour (hrs)	60	119	114	160	103	111
Average hourly wage	5	5	6	5	5	5
Total unpaid labour	304	646	664	829	560	601
Total cost including unpaid labour						
Variable Cost	803	1,373	1,445	1,896	1,689	1,441
Fixed Cost	391	207	221	278	440	307
Total Cost	1,193	1,580	1,666	2,174	2,129	1,749

Source: FADN.

Sunflower

Table A2.20: Sunflower Production Costs, Spain

	2000	2001	2002	2003	2004	FADN Average
Variable Costs						
Seed	31	41	66	65	55	52
Fertiliser	18	60	61	26	52	43
Crop Protection	8	29	35	39	26	28
Other Specific Costs	2	0	-	2	-	1
Energy and Fuel	40	40	55	29	30	39
Contracted labour/services	21	13	26	64	59	37
Water/irrigation	0	14	15	3	0	6
Other Direct costs	6	16	27	54	45	30
Labour (paid)	4	27	21	23	50	25
Total Variable costs	130	240	307	305	317	260
Fixed Costs						
Machinery	9	12	16	16	18	14
Depreciation	22	24	38	14	23	24
Rent	9	11	11	65	49	29
Interest	-	-	1	7	1	2
Total Fixed Costs	40	48	65	103	90	69
Total Costs	170	288	373	408	407	329
Total Unpaid labour (hrs)	41	45	40	76	60	52
Average hourly wage	5	5	6	5	5	5
Total unpaid labour	206	246	236	391	325	281
Total cost including unpaid labour						
Variable Cost	316	461	520	658	610	513
Fixed Cost	60	72	89	142	123	97
Total Cost	376	533	609	800	733	610

Source: FADN.

Appendix 3: Supplementary Spanish Data

BACKGROUND

Cost data on a sample of Spanish farms is available from a private independent database. Fifteen farms in the sample grow cotton. They farm on average 130 hectares and of this area around 25% is under cotton.

As the same farms are sampled each year, a set of consistent estimates can be developed. Data for some farms is also available for 2006 although the sample is not complete.

PRODUCTION COSTS

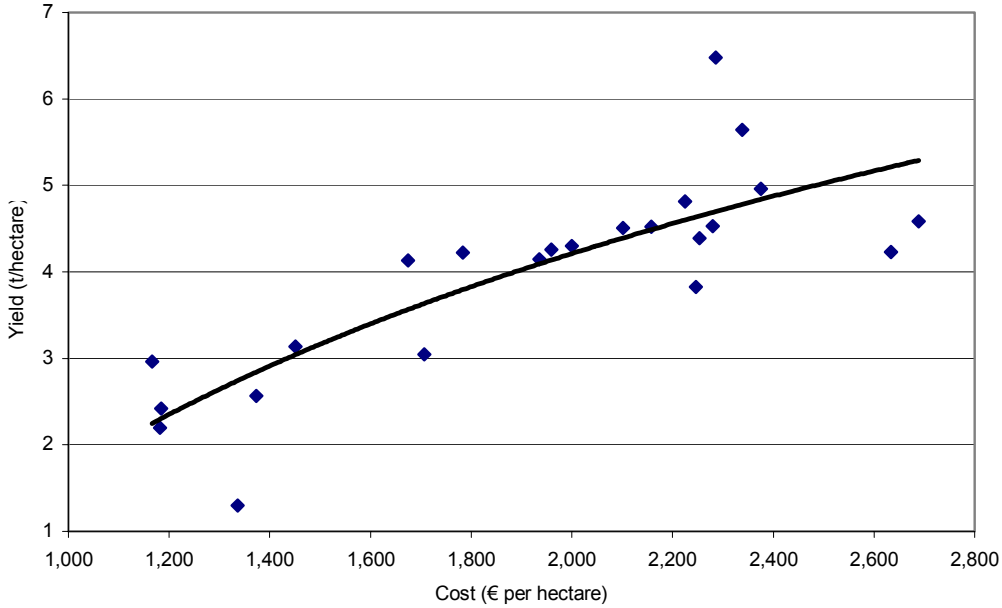
Cotton variable production costs average €2,285 per hectare in the five years prior to 2005/06. Yields averaged over 4 tonnes per hectare. During 2005/06 per hectare costs fell to €1,350 per tonne while yields fell to 2.5 tonnes per hectare. This more extensive production system required a significantly lower level of inputs. Labour, fertiliser and pesticide use fell by over 40% in euro terms (Table A3.1). Using the 2004/05 and 2005/06 data the relationship between yields and costs is shown in Diagram A3.1.

Table A3.1: Cotton Variable Production Costs (€ per hectare)

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	Change 2005/06 v 2004/05
a. Seed	89	105	93	101	111	74	-33%
b. Fertiliser	272	239	240	230	250	129	-48%
c. Pesticides	444	588	789	475	479	278	-42%
d. Water	136	142	129	122	178	139	-22%
e. Energy and Fuel	7	3	13	2	3	4	33%
f. Labour	236	236	454	504	364	189	-48%
g. Hired Labour/ Contracted Services	794	775	595	615	638	459	-28%
h. Other Cultivation	291	259	145	188	92	75	-19%
Total Variable Cost	**2,269**	**2,347**	**2,458**	**2,237**	**2,114**	**1,348**	**-36%**
Yield			3,587	4,564	4,527	2,519	-44%

Source: Independent database

Diagram A3.1: Relationship between Yields and Costs



ALTERNATIVE CROPS

For the same farms, it is possible to calculate costs for the major alternative crops being grown. In Table A3.2 we present costs for durum wheat, sunflower, maize, potato and sugar beet.

Table A3.2: Alternative Crops Variable Production Costs on Farms also Growing Cotton(€ per hectare)

	2002/03	2003/04	2004/05	2005/06
Durum Wheat	.			
a. Seed	77	108	60	55
b. Fertiliser	97	125	94	91
c. Pesticides	68	98	31	51
d. Water	0	4	19	7
e. Energy and Fuel	2	2	4	2
f. Labour	67	96	111	53
g. Hired Labour/Contracted Services	89	85	61	54
h. Other Cultivation	18	26	12	14
Total Variable Cost	417	544	392	328
Sunflower	.			
a. Seed	83	76	71	65
b. Fertiliser	1	7	1	12
c. Pesticides	76	52	58	42
d. Water	18	11	17	26
e. Energy and Fuel	2	1	2	4
f. Labour	153	116	139	48
g. Hired Labour/Contracted Services	119	99	77	139
h. Other Cultivation	2	1	3	4
Total Variable Cost	454	362	368	342
Maize	.			
a. Seed	244	176	209	113
b. Fertiliser	271	255	307	299
c. Pesticides	91	92	59	160
d. Water	133	105	130	130
e. Energy and Fuel	9	2	3	0
f. Labour	210	187	181	124
g. Hired Labour/Contracted Services	250	179	179	247
h. Other Cultivation	99	24	79	114
Total Variable Cost	1,306	1,019	1,148	1,187
Potato	.			
a. Seed	1,460	1,117	1,142	1,122
b. Fertiliser	312	314	356	216
c. Pesticides	350	337	255	226
d. Water	166	271	215	338
e. Energy and Fuel	23	0	0	32
f. Labour	535	512	426	269
g. Hired Labour/Contracted Services	1,200	985	1,571	1,748
h. Other Cultivation	9	9	4	6
Total Variable Cost	4,055	3,546	3,969	3,956
Sugarbeet	.			
a. Seed	238	332	255	219
b. Fertiliser	190	176	199	211
c. Pesticides	587	436	350	326
d. Water	120	106	244	133
e. Energy and Fuel	19	14	21	21
f. Labour	448	338	442	401
g. Hired Labour/Contracted Services	483	386	327	361
h. Other Cultivation	299	346	345	328
Total Variable Cost	2,384	2,135	2,183	2,002

Source: Private Database.

Appendix 4: Spain Farmer Survey

TOTAL FARM AREA

Number of Farms Surveyed

Farm Size	Region	No of responses
<10ha	Cadiz	4
	Jaen	2
	Sevilla	1
10-20ha	Cadiz	2
	Murcia	2
	Sevilla	8
>20ha	Cadiz	2
	Cordoba	7
	Jaen	6
	Sevilla	23
Total		57

Average Farm Size (ha)

Farm Size	Region	Average Area (ha)
<10ha	Cadiz	5
	Jaen	5
	Sevilla	7
10-20ha	Cadiz	16
	Murcia	16
	Sevilla	14
>20ha	Cadiz	420
	Cordoba	443
	Jaen	99
	Sevilla	87

ANNUAL PRODUCTION OF COTTON

Average Area Under Cotton (hectares)

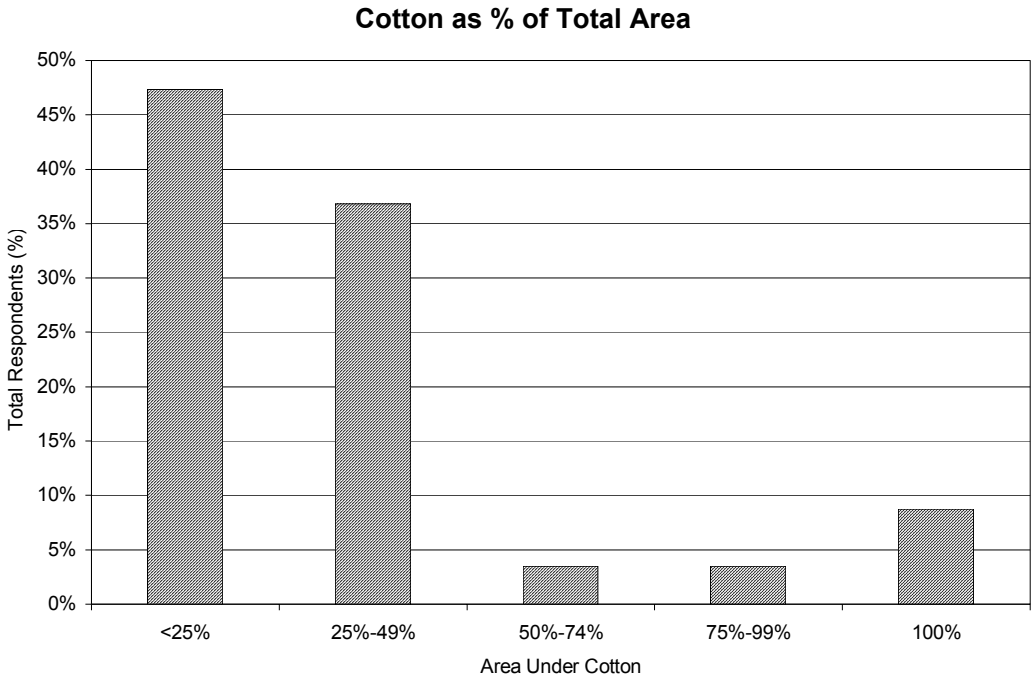
Farm Size	Region	2006	2005	2004	2000
<10ha	Cadiz	4.4	5.1	2.2	4.8
	Jaen	3.1	3.1	3.1	1.6
	Sevilla	2.0	4.0	4.0	
10-20ha	Cadiz	13.8	9.9	8.7	17.3
	Murcia	7.2	5.5	7.2	
	Sevilla	4.5	5.9	6.9	6.1
>20ha	Cadiz	80.0	38.0	80.0	90.0
	Cordoba	31.9	34.3	29.4	52.3
	Jaen	29.8	26.2	27.0	14.5
	Sevilla	16.4	20.3	20.1	20.1

Cotton Area as % of Total

Farm Size	Region	Cotton Area as % of total
<10ha	Cadiz	69%
	Jaen	66%
	Sevilla	31%
10-20ha	Cadiz	83%
	Murcia	55%
	Sevilla	33%
>20ha	Cadiz	19%
	Cordoba	7%
	Jaen	27%
	Sevilla	27%

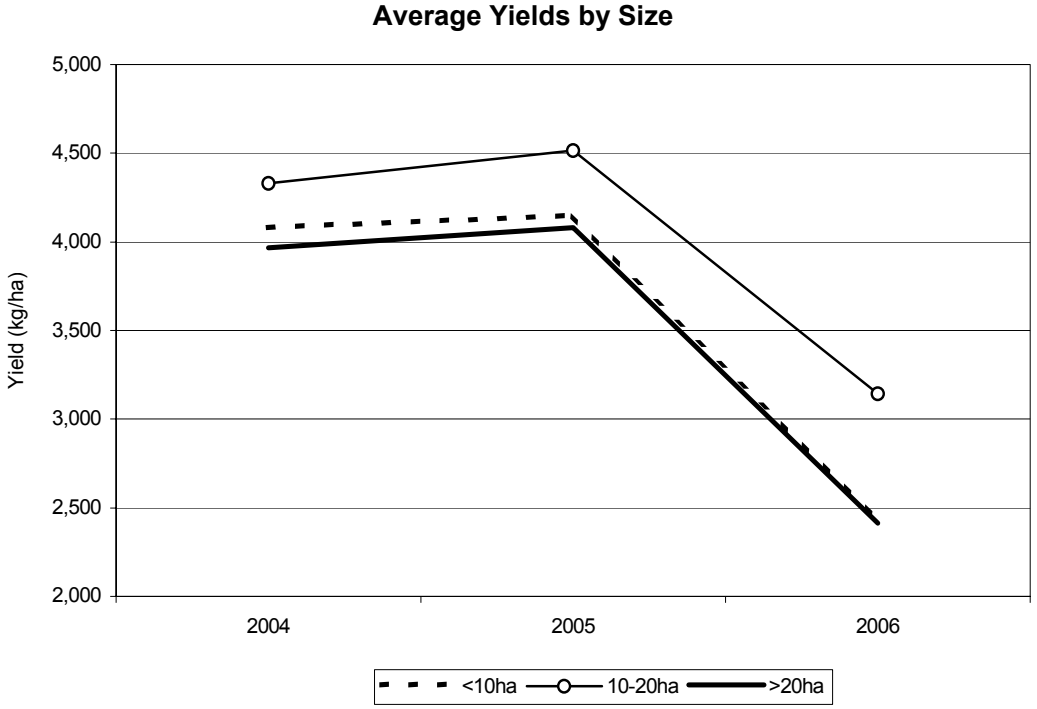
Importance of Cotton to Total Area

Farm Size	Area under Cotton	No of responses
<10ha	>25%	1
	25%-49%	2
	75%-99%	2
	100%	2
10-20ha	<25%	3
	25%-49%	5
	50%-74%	2
	100%	2
>20ha	>25%	23
	25%-49%	14
	100%	1



Average Yields (kg/hectare)

Farm Size	Region	2000	2004	2005	2006
<10ha	Cadiz	4,150	3,800	4,039	2,303
	Jaen	na	3,761	3,947	2,320
	Sevilla	na	5,000	5,000	3,000
10-20ha	Cadiz	3,800	3,800	4,000	4,000
	Murcia	na	4,643	5,485	3,851
	Sevilla	3,710	4,314	4,338	2,817
>20ha	Cadiz	2,725	3,050	3,500	1,975
	Cordoba	4,500	4,076	4,511	2,640
	Jaen	4,368	3,598	3,480	2,548
	Sevilla	3,849	4,126	4,158	2,386



Important Non-Cotton Crops

First	Second	No of responses
beet	lucerne	2
	tomato	2
	NA	2
durum wheat	beet	1
	maize	3
	oat	1
	olive plantation	3
	sunflower	8
	NA	5
garlic	potatoes	1
maize	durum wheat	1
	sunflower	1
	na	1
olive plantation	durum wheat	3
	sunflower	1
	NA	3
sunflower	durum wheat	2
	watermelon	1
	NA	1
tomato	beet	1
vegetable	durum wheat	1

QUESTION NUMBER 1: LABOUR USE

1. How many members of the household work on the farm (in 2006)?

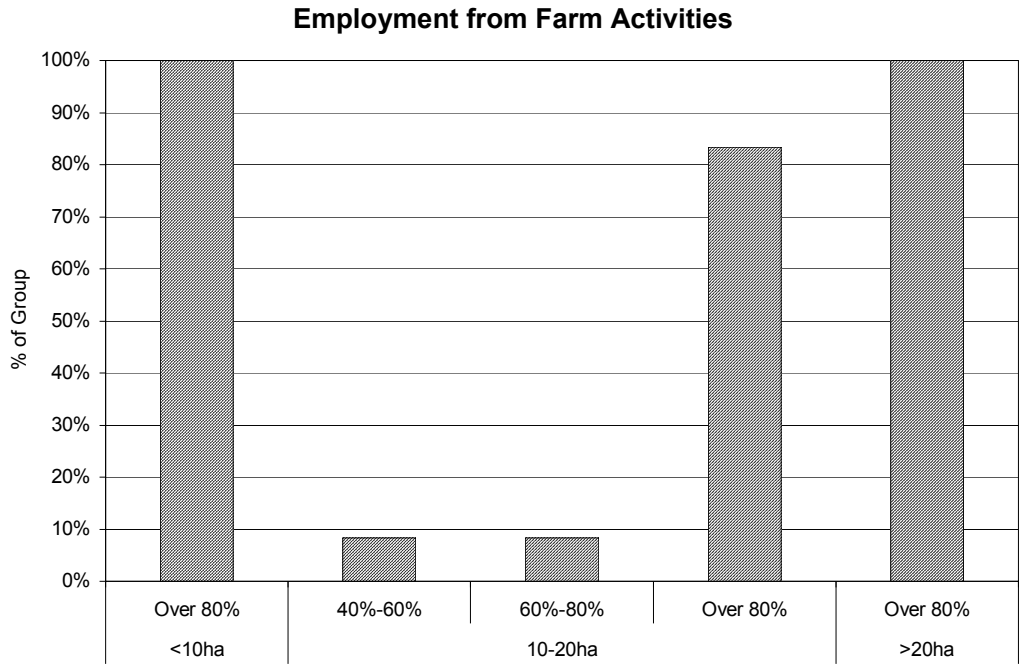
Farm Size	Total	Male	Female
<10ha	1.29	1.14	0.14
10-20ha	1.42	1.08	0.33
>20ha	1.68	1.42	0.26

2. Of these, how many derive their main employment from the farm (in 2006 ?)

Farm Size	Total	Male	Female
<10ha	0.29	0.29	0.00
10-20ha	0.75	0.67	0.08
>20ha	1.13	1.11	0.03

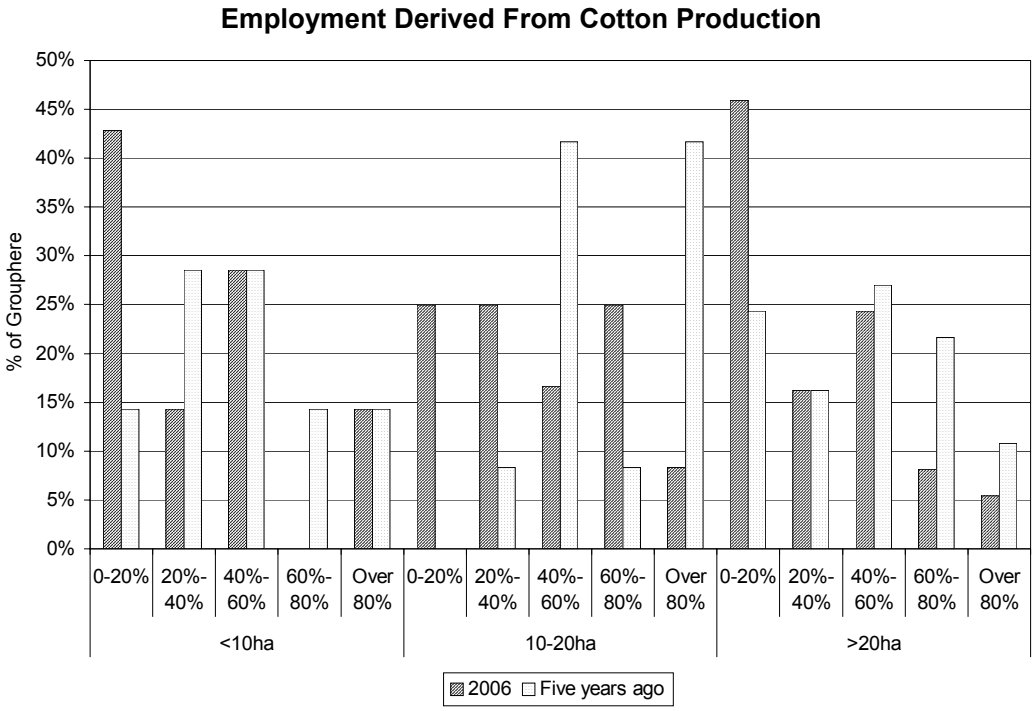
3. What percentage of farm household employment is derived from farm (as opposed to non-farm) activities?

Farm Size	Employment from Farm Activities	Number	% of Group
<10ha	Over 80%	7	100%
10-20ha	40%-60%	1	8%
	60%-80%	1	8%
	Over 80%	10	83%
>20ha	Over 80%	38	100%



4. What percentage of household employment is derived from cotton production?

Farm Size	Employment Derived From Cotton	2006	Five years ago
<10ha	0-20%	3	1
	20%-40%	1	2
	40%-60%	2	2
	60%-80%		1
	Over 80%	1	1
10-20ha	0-20%	3	
	20%-40%	3	1
	40%-60%	2	5
	60%-80%	3	1
	Over 80%	1	5
>20ha	0-20%	17	9
	20%-40%	6	6
	40%-60%	9	10
	60%-80%	3	8
	Over 80%	2	4



5. How many people are employed on the farm, in addition to household labour?

Farm Size	Average	Max	Min
<10ha	0.14	1	-
10-20ha	0.67	4	-
>20ha	7.41	118	-

In 24 cases, no labour was employed. Where labour was being employed the average number of people being employed it presented below:

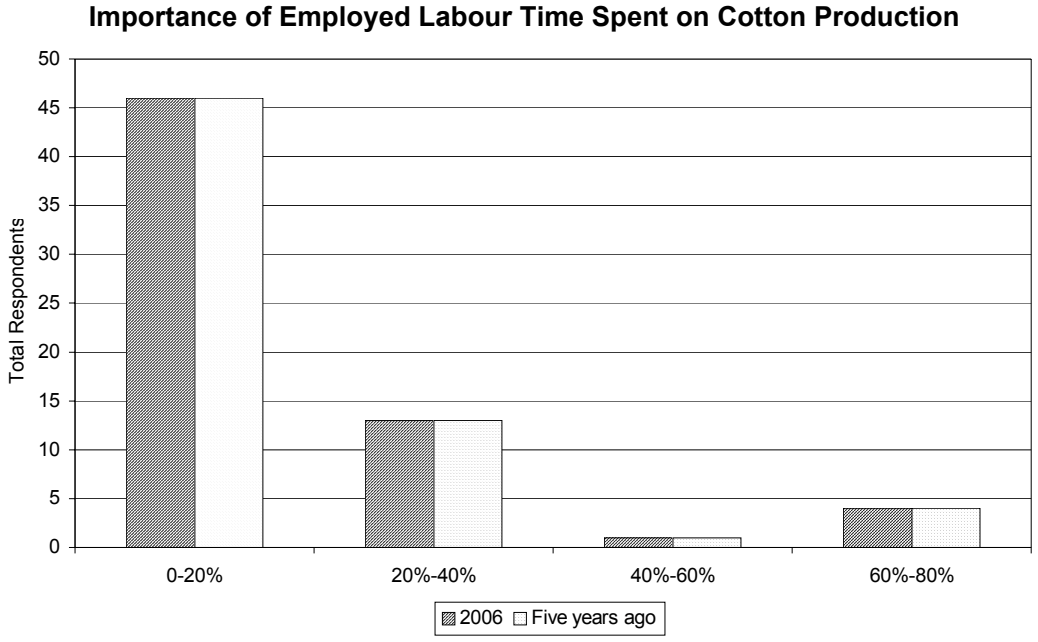
Farm Size	Average excluding farms not employing labour
<10ha	1.0
10-20ha	2.0
>20ha	11.0

6. What is the proportion of full time and seasonal/casual labour among employed workers?

Farm Size	Full time %
<10ha	0%
10-20ha	0%
>20ha	28%

7. What percentage of employed labour time is spent on cotton production?

Farm Size	Employment on Cotton	2006	Five years ago
<10ha	0-20%	33	33
	Over 80%	1	1
10-20ha	0-20%	6	6
	20%-40%	4	1
	40%-60%	1	1
	60%-80%		3
>20ha	0-20%	7	3
	20%-40%	9	6
	40%-60%		4
	60%-80%	3	4
	Over 80%	3	5



8. Do you contract out specific farm operations?

Farm Size	Contracting out operations	Number	% of Group
<10ha	Some	6	86%
	None	1	14%
10-20ha	All	1	8%
	Some	11	92%
>20ha	Some	36	95%
	None	2	5%

9. Are contracted services undertaken by a cooperative/partnership in which you are a participant?

Farm Size	Contract to coop	Number	% of Group
<10ha	No	6	86%
	Yes	1	14%
10-20ha	No	4	33%
	Yes	8	67%
>20ha	No	23	61%
	Yes	15	39%

10. Where the farm is entirely contracted out, what is the basis for the payment for the use of land?

In all cases the basis for the arrangement was rent paid for the land

11. and 12. How many days of labour were spent on cotton production during 2006 and 2005? (days refers to full days spend on cotton activities not partial days, partial days should be summed to give full day equivalents, i.e., 8 hours)

Farm Size	Labour	2006	2005	Change
<10ha	Household	7.27	7.33	-1%
	Paid	-	0.03	
	Contracted	0.72	1.02	-30%
10-20ha	Household	6.90	7.15	-3%
	Paid	0.37	-	
	Contracted	1.14	1.23	-7%
>20ha	Household	3.07	2.89	6%
	Paid	1.16	1.57	-26%
	Contracted	0.42	0.55	-23%

Note: Results calculated to give days per hectare.

13. What is the cost to you (including non-wage benefits) of employed labour per annum?

Labour	€ per annum
Skilled	9,530
Unskilled	5,165

Note: based on total wage cost divided by number of employees, with the assumption that skilled workers are full time employees.

14. What is the cost of contracted services for cotton?

Activity	€ per ha
Land Preparation	192
Planting	35
Irrigation	90
Fertiliser	12
Herbicides	8
Insecticide	8
Harvesting	255

QUESTION NUMBER 2: COTTON PRODUCTION

1. How has your total farmed area changed since 2000

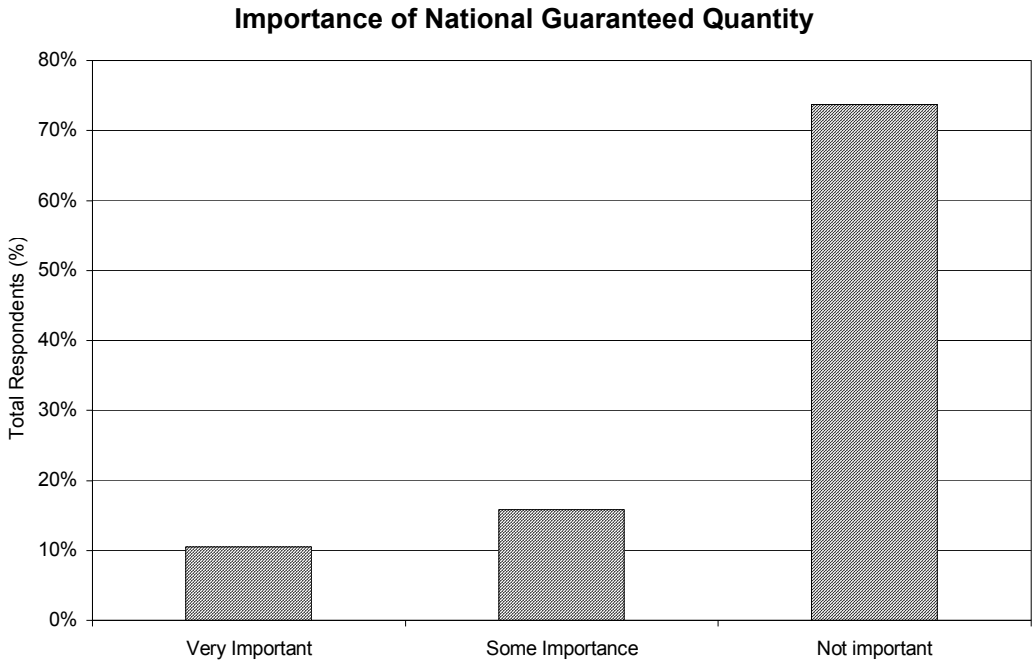
Farm Size	Change	2006 v 2005	2005 v 2000
<10ha	No Change	86%	86%
	Decrease	14%	14%
10-20 ha	No Change	100%	85%
	Decrease		8%
	Increase		8%
>20 ha	No Change	89%	84%
	Decrease	5%	5%
	Increase	5%	11%

2. How has your cotton area changed since 2000

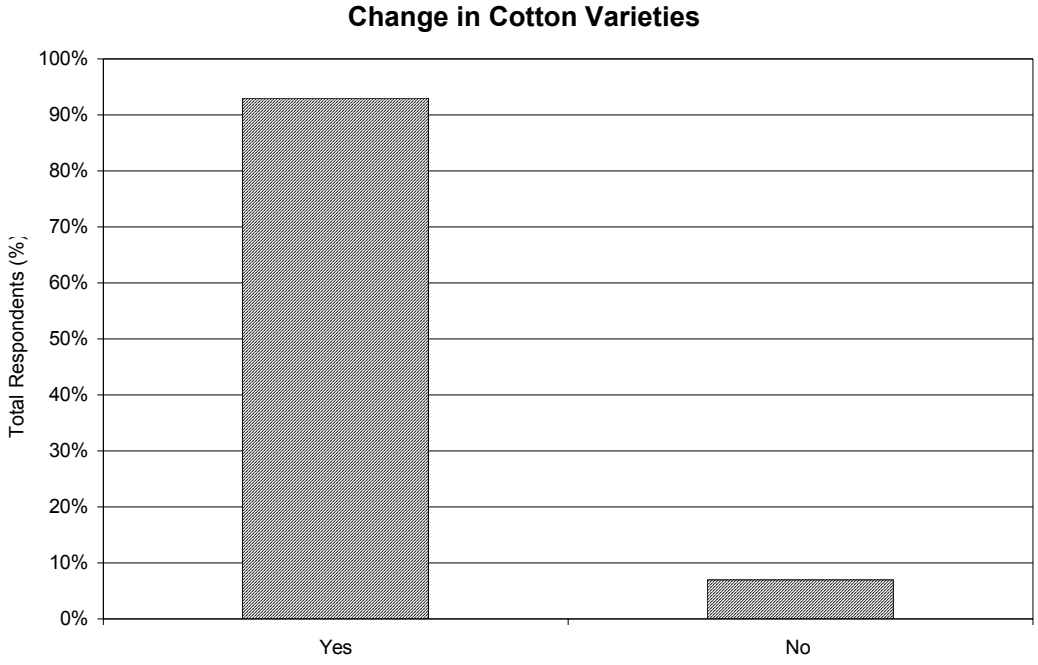
Size	Change	2006 v 2005	2005 v 2000
<10ha	No Change	71%	86%
	Decrease	29%	14%
10-20 ha	No Change	42%	67%
	Decrease	33%	33%
	Increase	25%	0%
>20 ha	No Change	59%	70%
	Decrease	38%	11%
	Increase	3%	19%

3. How important was the “National Guaranteed Quantity (NGQ)” in determining the amount of cotton to be grown?

Farm Size	Importance of NGQ	Number
<10ha	Some Importance	1
	Not important	6
10-20ha	Some Importance	3
	Not important	9
>20ha	Very Important	6
	Some Importance	5
	Not important	27

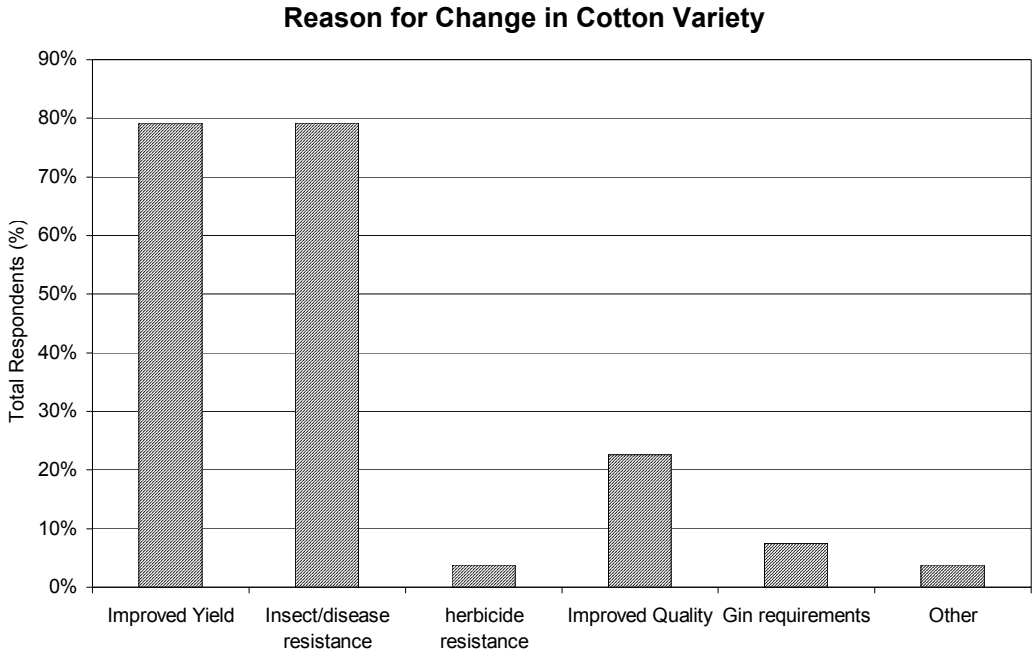


4. Has the variety of cotton grown changed over the last five years?



5. What are the reasons for the change in Variety

Farm Size		Improved Yield	Insect/disease resistance	herbicide resistance	Improved Quality	Gin requirements	Other
<10ha	No	43%	14%	86%	71%	100%	100%
	Yes	57%	86%	14%	29%	0%	0%
10-20ha	No	27%	9%	91%	55%	82%	100%
	Yes	73%	91%	9%	45%	18%	0%
>20ha	No	14%	26%	100%	86%	94%	94%
	Yes	86%	74%	0%	14%	6%	6%



6. Who provides seed, fertiliser, chemicals etc, for growing cotton?

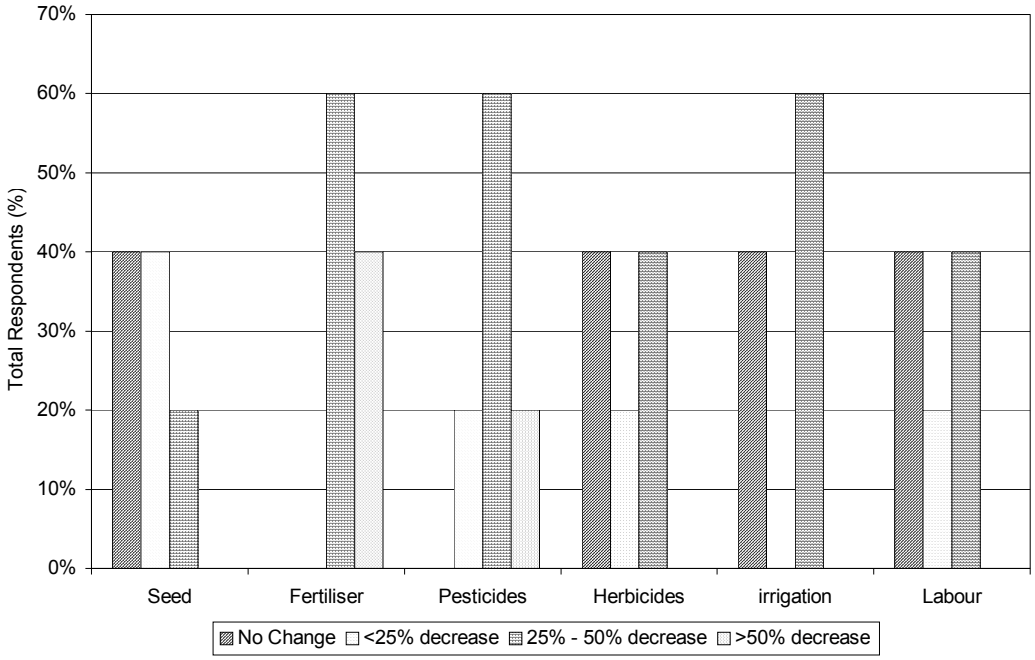
Farm Size	Provider	Number	%
<10ha	Cooperatives	2	29%
	Other	5	71%
10-20ha	Cooperatives	9	75%
	Gins	1	8%
	Other	2	17%
>20ha	Cooperatives	19	50%
	Gins	2	5%
	Other	17	45%

7. How has your use of inputs per hectare for cotton changed since 2000 (in percentage or quantity terms, not both)?

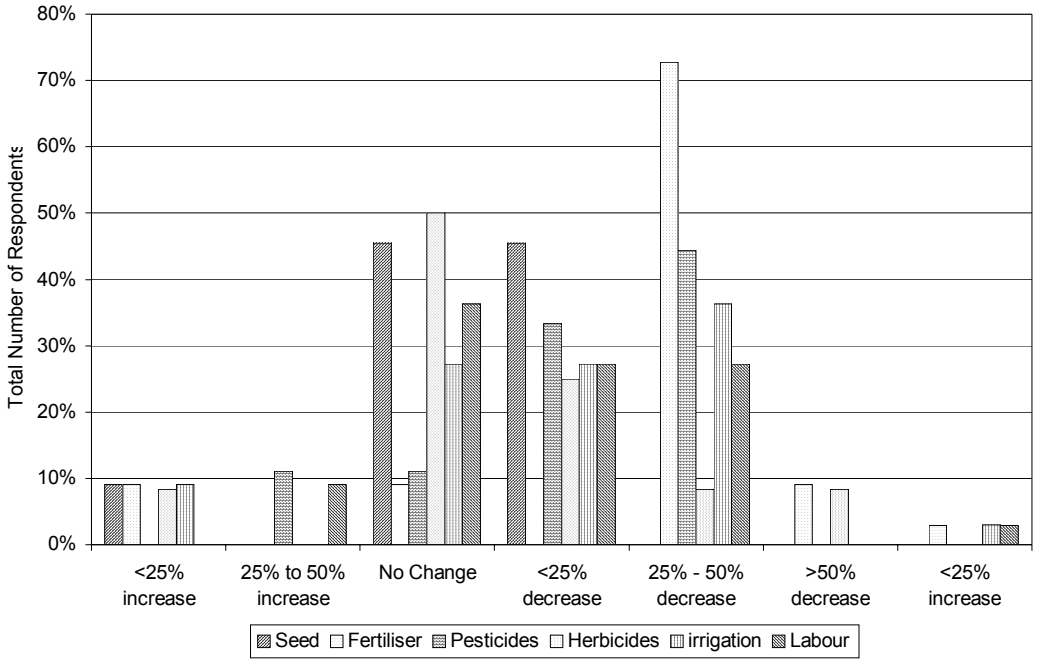
Change in Inputs 2005 v 2006

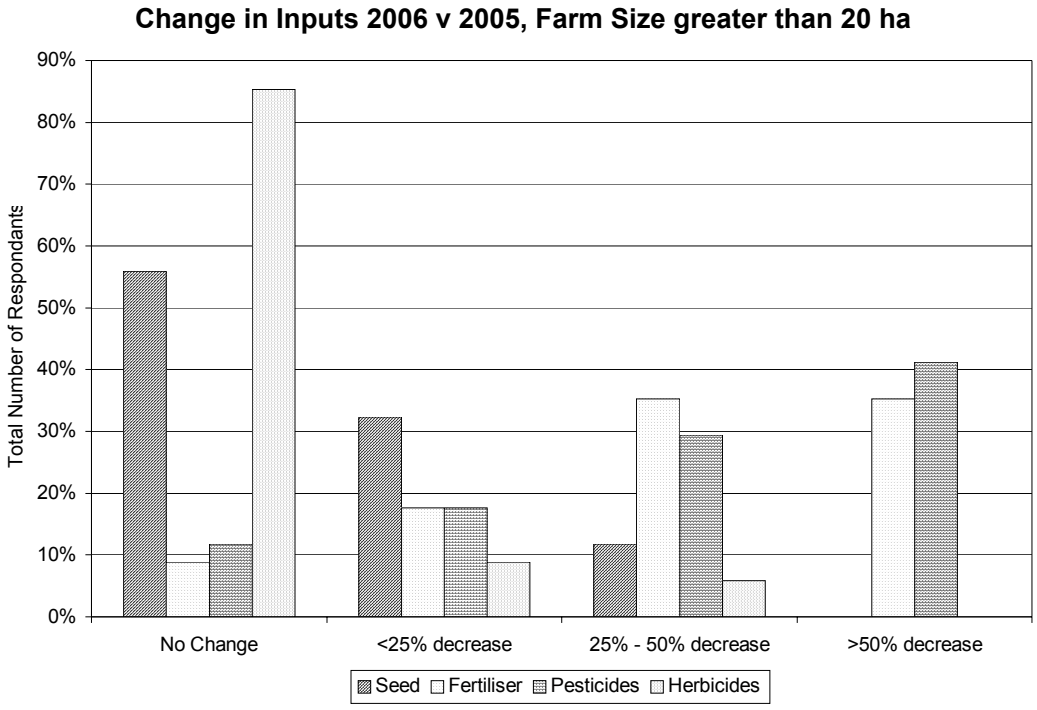
Farm Size		Seed	Fertiliser	Pesticides	Herbicides	irrigation	Labour
<10ha	No Change	40%	0%	0%	40%	40%	40%
	<25% decrease	40%	0%	20%	20%	0%	20%
	25% - 50% decrease	20%	60%	60%	40%	60%	40%
	>50% decrease	0%	40%	20%	0%	0%	0%
10-20ha	<25% increase	9%	9%	0%	8%	9%	0%
	25% to 50% increase	0%	0%	11%	0%	0%	9%
	No Change	45%	9%	11%	50%	27%	36%
	<25% decrease	45%	0%	33%	25%	27%	27%
	25% - 50% decrease	0%	73%	44%	8%	36%	27%
	>50% decrease	0%	9%	0%	8%	0%	0%
	<25% increase	0%	3%	0%	0%	3%	3%
>20ha	No Change	56%	9%	12%	85%	21%	24%
	<25% decrease	32%	18%	18%	9%	18%	24%
	25% - 50% decrease	12%	35%	29%	6%	45%	26%
	>50% decrease	0%	35%	41%	0%	12%	24%

Change in Inputs 2006 v 2005, Farm Size less than 10 ha



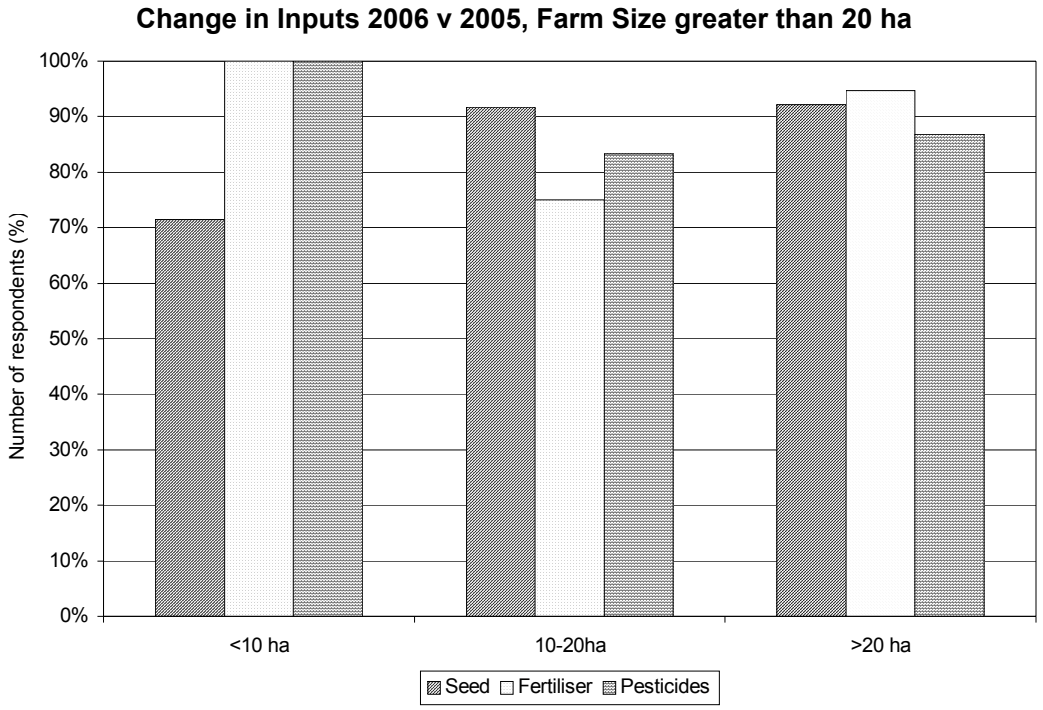
Change in Inputs 2006 v 2005, Farm Size 10 ha to 20 ha





Change in Inputs 2000 v 2005

Farm Size		Seed	Fertiliser	Pesticides	Herbicides	irrigation	Labour
<10ha	No Change	71%	100%	100%	100%	100%	100%
	<25% decrease	14%	0%	0%	0%	0%	0%
	25% - 50% decrease	0%	0%	0%	0%	0%	0%
	>50% decrease	14%	0%	0%	0%	0%	0%
10-20ha	<25% increase	0%	0%	0%	0%	0%	0%
	25% to 50% increase	-	0%	0%	0%	0%	0%
	No Change	92%	75%	83%	92%	92%	75%
	<25% decrease	0%	17%	8%	0%	0%	17%
	25% - 50% decrease	8%	8%	8%	8%	8%	8%
	>50% decrease	-	-	-	-	0%	-
	<25% increase	5%	5%	8%	5%	5%	3%
>20ha	No Change	92%	95%	87%	95%	95%	95%
	<25% decrease	0%	0%	5%	0%	0%	3%
	25% - 50% decrease	3%	0%	0%	0%	0%	0%
	>50% decrease	0%	0%	0%	0%	0%	0%



8. Has your investment in farm machinery changed over the last five years?

Farm Size	Investment	Number	%
<10ha	Increase	1	14%
	Decrease	6	86%
10-20ha	Increase	4	33%
	Decrease	8	67%
>20ha	Increase	24	63%
	Decrease	14	37%

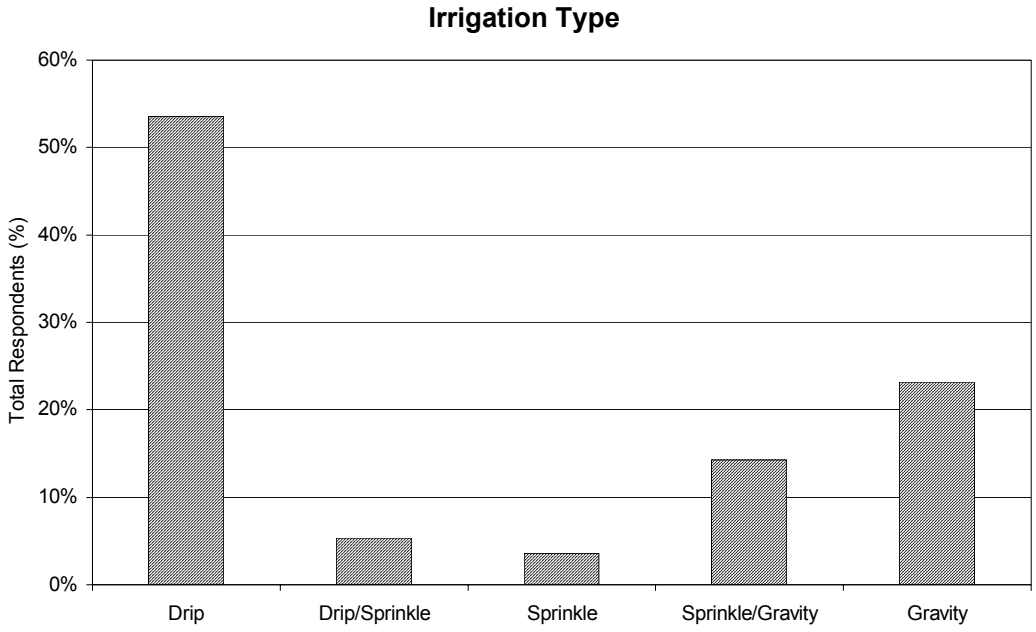
9. What proportion of the cotton area is irrigated?

All irrigated, except for one farm with 0-20% irrigation

No change over the last five years

10. How do you irrigate?

Farm Size	Irrigation Type	Number	% by size
<10ha	Drip	2	29%
	Sprinkle/Gravity	2	29%
	Gravity	3	43%
10-20ha	Drip	7	58%
	Sprinkle/Gravity	4	33%
	Gravity	1	8%
>20ha	Drip	21	57%
	Drip/Sprinkle	3	8%
	Sprinkle	2	5%
	Sprinkle/Gravity	2	5%
	Gravity	9	24%



11. Has this changed over the last five years?

Only 8 respondents reported changing irrigation types. In all cases, sprinkle or gravity has changed to drip

12. What proportion of the cotton area is under plastic?

No cotton was under plastic in 2006

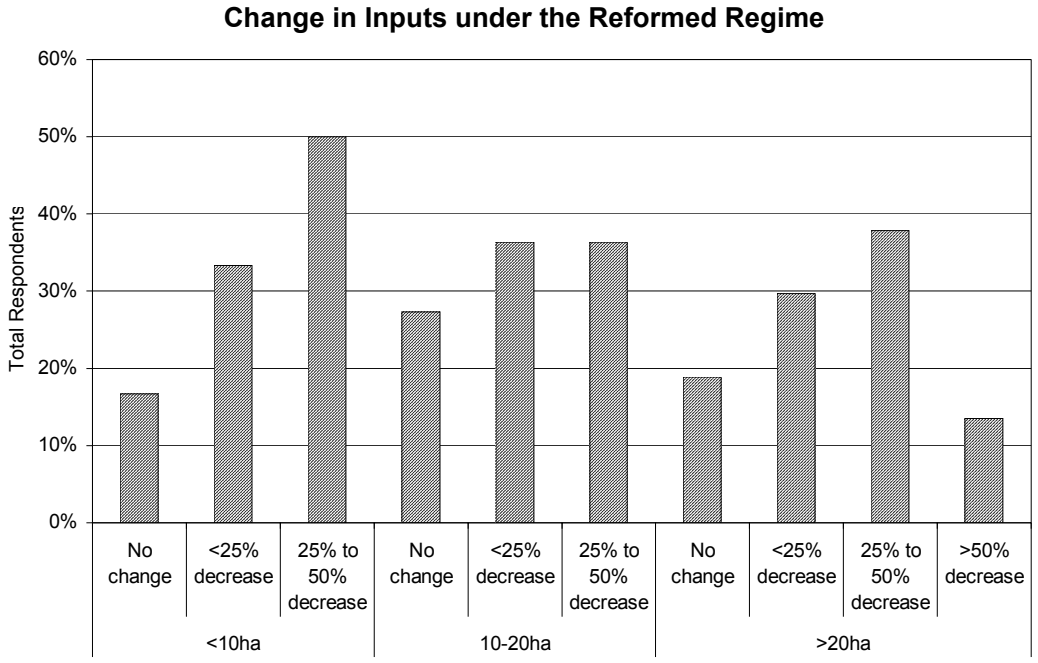
13. Has the use of irrigation over the past 5 years was affected by:

Environmental constraints *Water availability* *Other factors*

This was only a factor in 7 responses on the larger farms, in 3 cases water availability was an issue in the others “other factors”.

14. Under the reformed regime, has the fact that the crop has to be maintained at least until the boll opening under normal growing conditions affected the use of inputs

Farm Size	Change in input use	% of total group
<10ha	No change	17%
	<25% decrease	33%
	25% to 50% decrease	50%
10-20ha	No change	27%
	<25% decrease	36%
	25% to 50% decrease	36%
>20ha	No change	19%
	<25% decrease	30%
	25% to 50% decrease	38%
	>50% decrease	14%



15. How do you harvest?

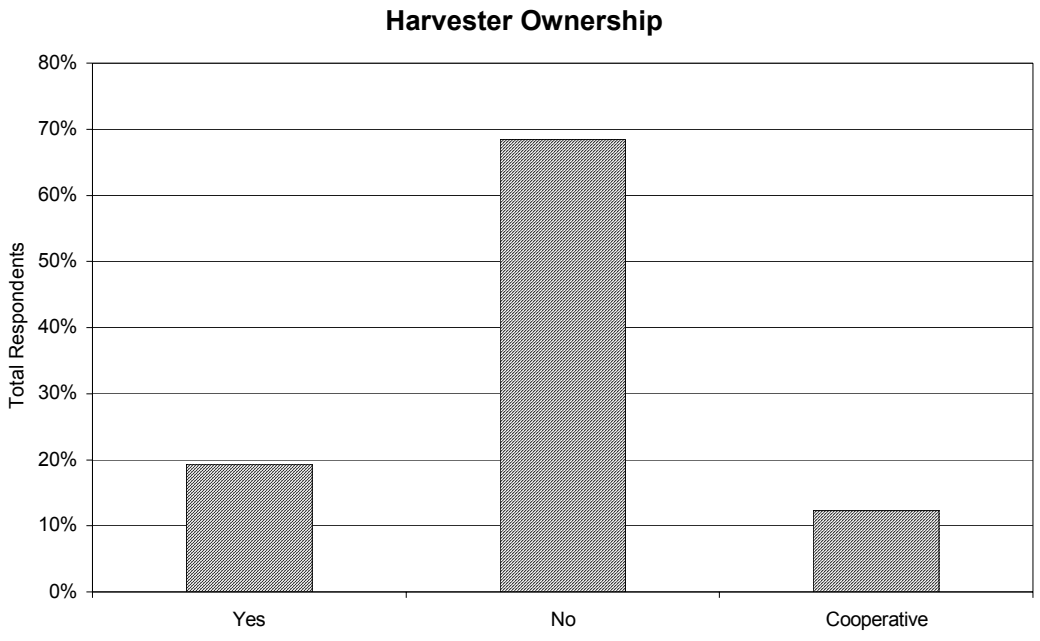
All mechanical harvesting

16. What is the cost of harvesting per hectare?

Farm Size	€ per ha
<10ha	229
10-20ha	238
>20ha	260

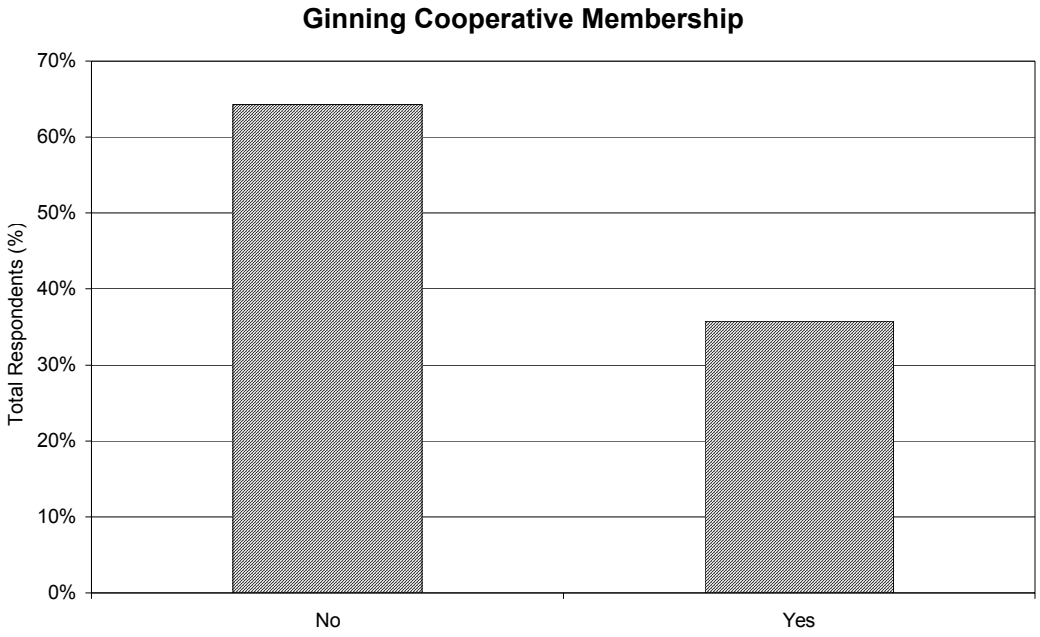
17. Do you own a harvester?

Farm Size	Own a harvester	Number
<10ha	Yes	2
	No	5
10-20ha	Yes	2
	No	7
	Cooperative	3
>20ha	Yes	7
	No	27
	Cooperative	4



18. Are you member of a ginning cooperative?

Farm Size	Member	Number	% by size
<10ha	No	6	100%
	Yes	-	0%
10-20ha	No	6	50%
	Yes	6	50%
>20ha	No	24	63%
	Yes	14	37%

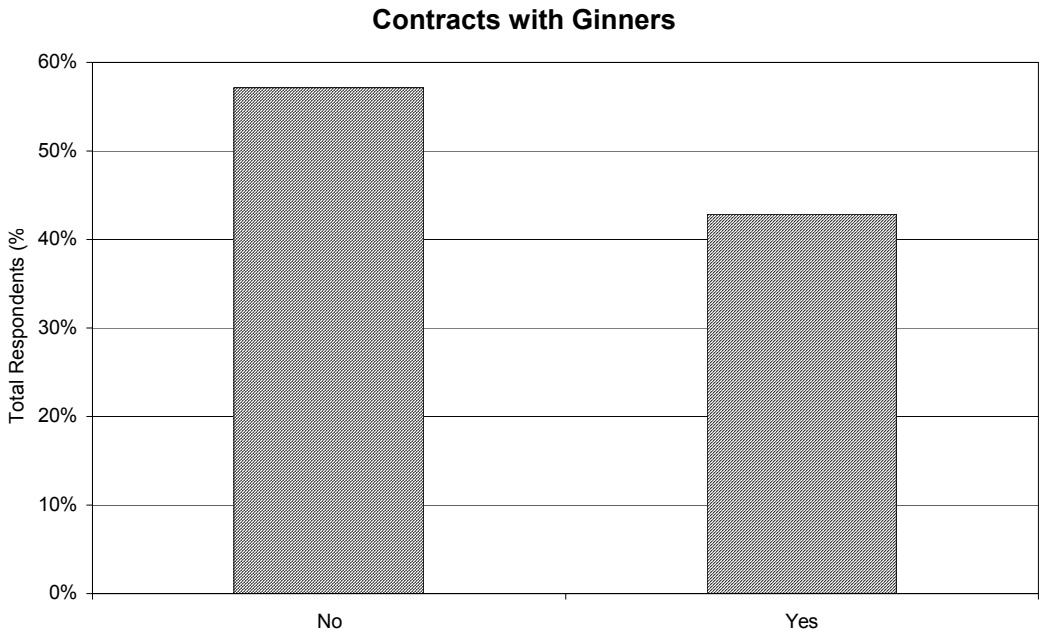


19. Which percentage of your production do you deliver to this cooperative?

Where a producer is a member of a cooperative 100% of production is delivered to the coop. One non-cooperative member delivers 100% of production to a coop.

20. Do you have a contract with a ginner (private or other cooperative)?

Farm Size	Contract with Ginner	Number	% by size
<10ha	No	4	57%
	Yes	3	43%
10-20ha	No	6	50%
	Yes	6	50%
>20ha	No	22	59%
	Yes	15	41%



21. Is there a possibility to sell your cotton to other ginners than these?

In all but 2 cases there was reported to be the possibility of selling to alternative ginners.

22. Do you receive a premium or incentive from the ginner for improved quality of cotton, such as for staple length, fibre strength, micronaire or colour? If so, how much (per tonne of seed cotton or per bale)?

Farm Size	Premium	Number	% by size
<10ha	No	4	57%
	Yes	3	43%
10-20ha	No	4	33%
	Yes	8	67%
>20ha	No	26	70%
	Yes	11	30%

Average Premium where Paid, 2006

Farm Size	€ per tonne
<10ha	33
10-20ha	40
>20ha	29

23. How much does it cost, per km or per tonne of seed cotton or per bale of cotton, to transport your seed cotton to the ginner?

Farm Size	€ per tonne
>20ha	19
<10ha	22
10-20ha	18

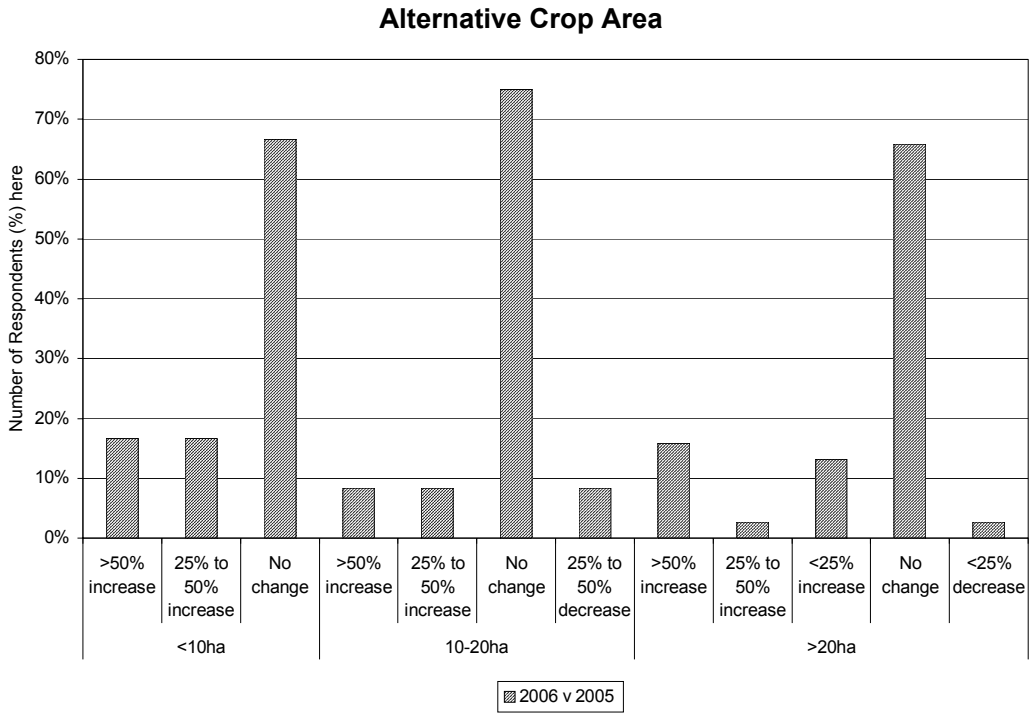
24. What was the price of unginned cotton in 2005 and 2006 (€ per kg)?

Farm Size	2006	2005
<10ha	0.238	0.906
10-20ha	0.247	0.947
>20ha	0.244	0.895

QUESTION NUMBER 3: ALTERNATIVE CROPS

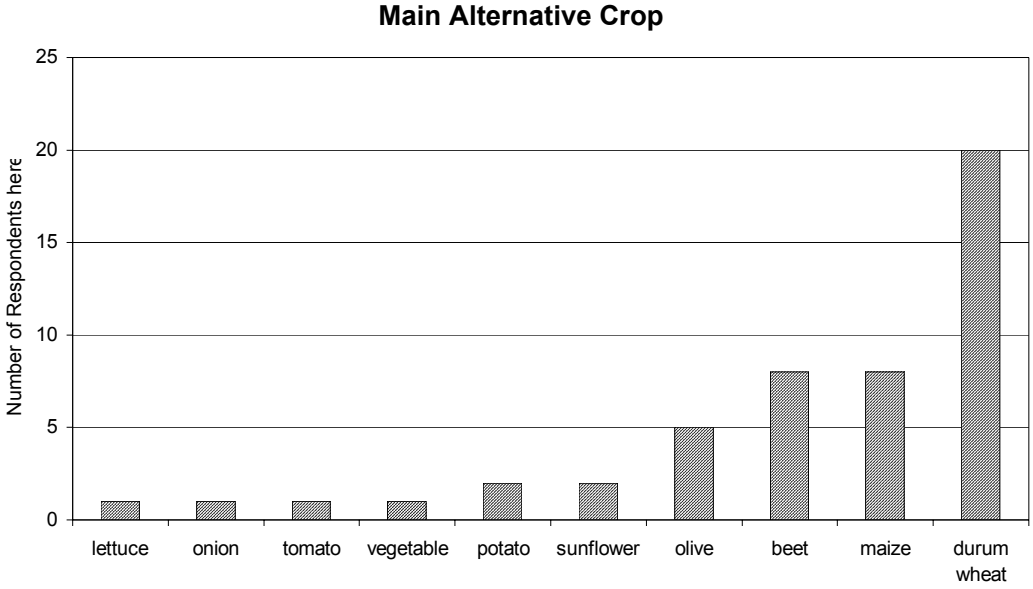
1. Has your area of non-cotton crops changed since 2000?

Size	Change	2006 v 2005	2005 v 2000
<10ha	>50% increase	17%	17%
	25% to 50% increase	17%	0%
	No change	67%	83%
10-20ha	>50% increase	8%	0%
	25% to 50% increase	8%	8%
	No change	75%	83%
	25% to 50% decrease	8%	8%
>20ha	>50% increase	16%	5%
	25% to 50% increase	3%	8%
	<25% increase	13%	8%
	No change	66%	76%
	<25% decrease	3%	3%



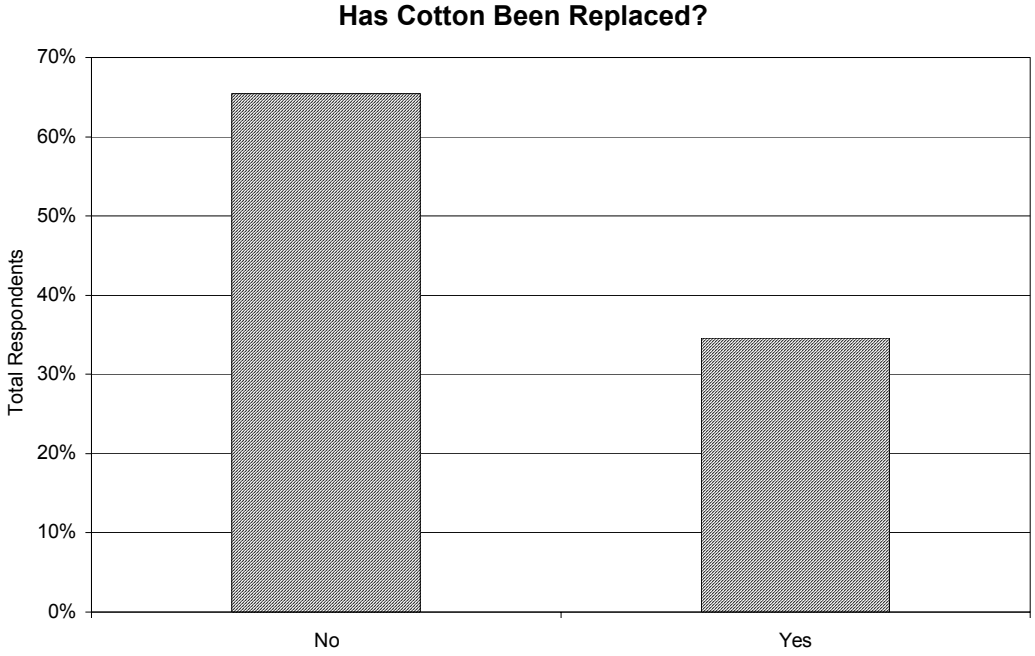
2. What is your main second crop?

Crop	Number
lettuce	1
onion	1
tomato	1
vegetable	1
potato	2
sunflower	2
olive	5
beet	8
maize	8
durum wheat	20



3. Has cotton been replaced by other crops? If so, which ones?

Farm Size	Has Cotton been replaced	Number	% by size
<10ha	No	4	67%
	Yes	2	33%
10-20ha	No	6	50%
	Yes	6	50%
>20ha	No	26	70%
	Yes	11	30%



Main Alternatives to Cotton

Farm Size	Alternatives	Number
<10ha	maize, beet	1
	olive plantation	1
10-20ha	durum wheat, asparagus, sunflower	1
	maize	1
	maize, sunflower	1
	sunflower	1
	vegetable	2
>20ha	durum wheat	4
	durum wheat, sunflower, maize	1
	lucerne, potatoes	1
	maize	2
	onion	1
	sunflower	1
	watermelon, durum wheat, sunflower	1

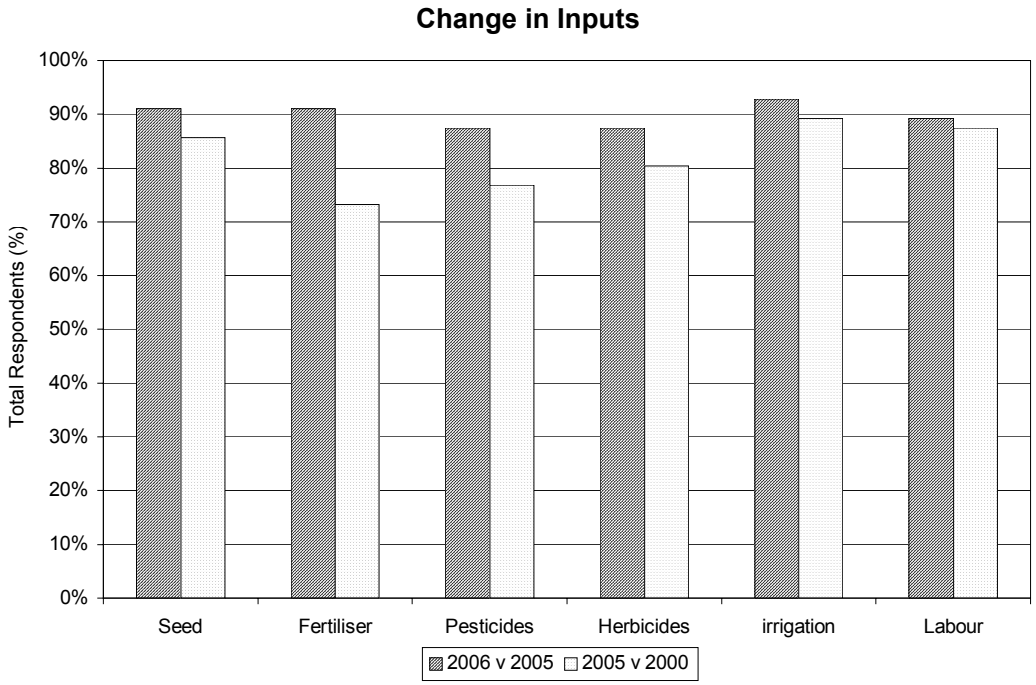
4. How has your use of inputs per hectare for the most important non-cotton crop changed since 2000?

Change in Inputs 2006 v 2005

Farm Size	Change	Seed	Fertiliser	Pesticides	Herbicides	irrigation	Labour
<10ha	>50% increase	14%	14%	14%	14%	14%	14%
	No Change	86%	86%	86%	86%	86%	86%
10-20ha	25 - 50% increase	0%	0%	0%	0%	0%	0%
	<25% increase	0%	0%	9%	18%	0%	0%
	No change	91%	91%	82%	73%	91%	82%
	<25% decrease	9%	9%	9%	9%	9%	18%
>20ha	25 - 50% increase	0%	0%	0%	0%	0%	0%
	<25% increase	8%	8%	8%	5%	3%	3%
	No change	92%	92%	89%	92%	95%	92%
	<25% decrease	0%	0%	3%	3%	3%	3%
	25% to 50% decrease	0%	0%	0%	0%	0%	3%

Change in Inputs 2005 v 2000

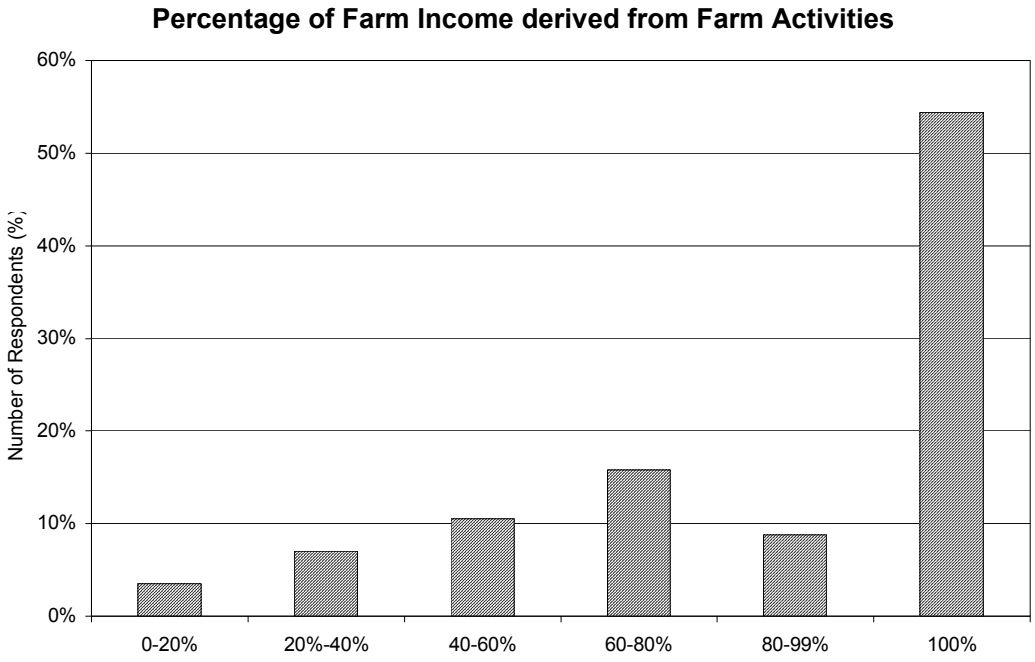
Farm Size	Change	Seed	Fertiliser	Pesticides	Herbicides	irrigation	Labour
<10ha	>50% increase	14%	0%	0%	0%	0%	0%
	No Change	86%	100%	100%	100%	100%	100%
10-20ha	25 - 50% increase	0%	18%	18%	18%	18%	18%
	<25% increase	0%	27%	27%	27%	0%	0%
	No change	91%	36%	45%	55%	73%	73%
	<25% decrease	9%	18%	9%	0%	9%	9%
>20ha	25 - 50% increase	0%	3%	0%	3%	0%	0%
	<25% increase	11%	13%	13%	13%	5%	5%
	No change	84%	79%	82%	84%	92%	89%
	<25% decrease	5%	5%	5%	0%	3%	3%
	25% to 50% decrease	0%	0%	0%	0%	0%	3%



QUESTION NUMBER 4: PRODUCERS' INCOME LEVELS

What percentage of farm household income (including decoupled aid) is derived from farm (as opposed to non-farm) activities?

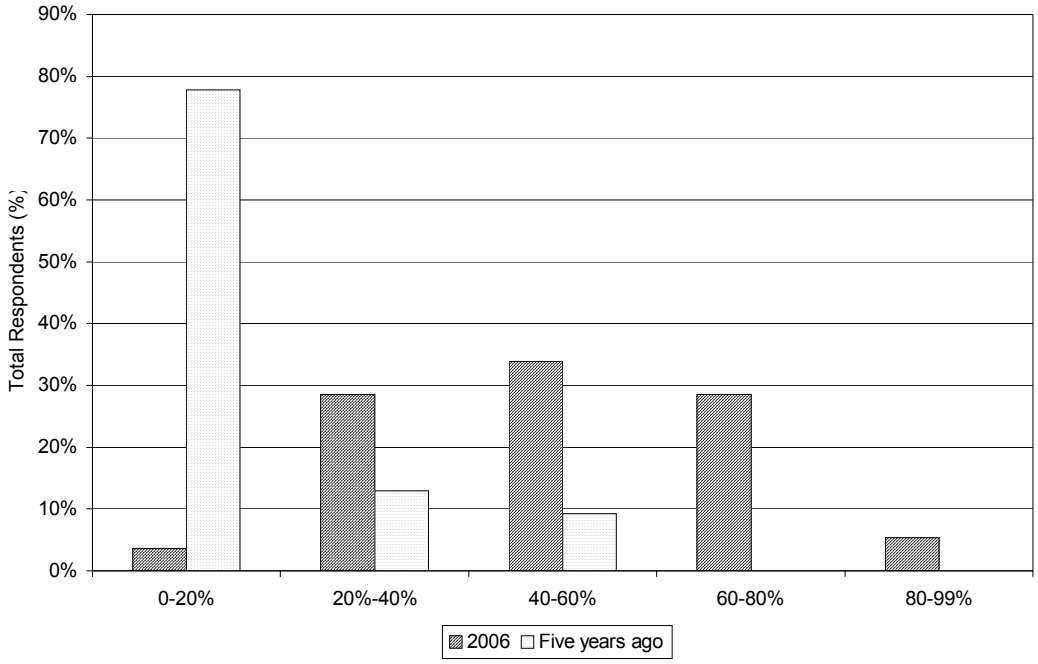
Farm Size	Percentage of income	Number
<10ha	0-20%	1
	20%-40%	3
	40%-60%	1
	60%-80%	2
10-20ha	20%-40%	1
	40-60%	1
	60-80%	4
	80-99%	1
	100%	5
>20ha	0-20%	1
	40-60%	4
	60-80%	3
	80-99%	4
	100%	26



What percentage of farm income is derived from direct payments (from cotton and other crops), which is not tied to the choice of crop (decoupled aid)?

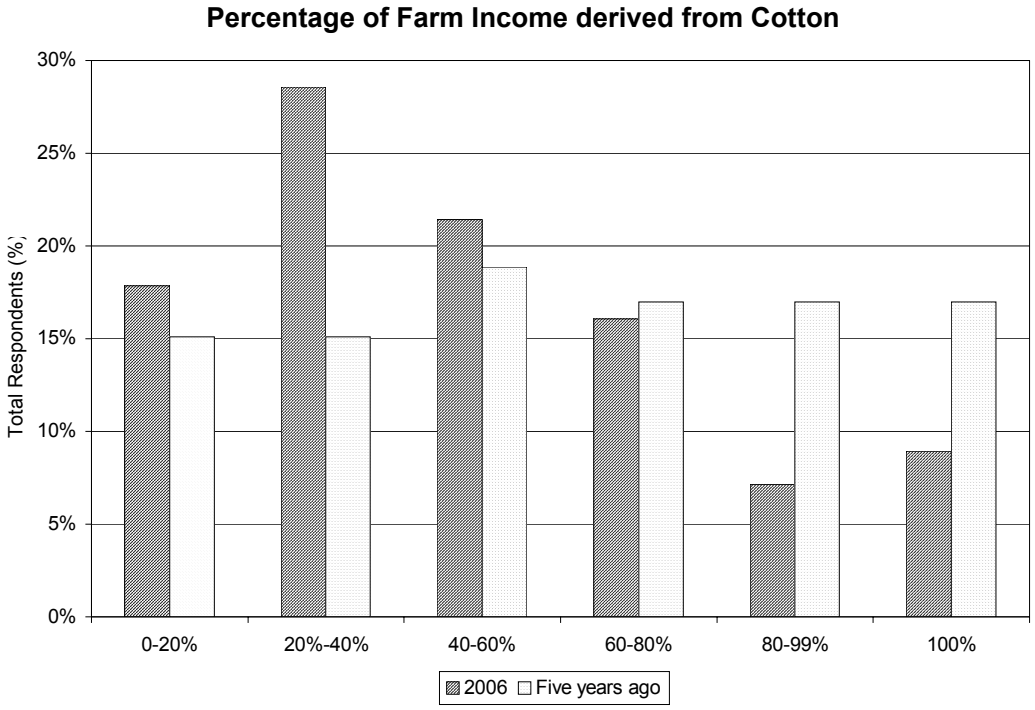
Farm Size	Income % direct payments	2006	Five years ago
		Number	Number
<10ha	0-20%	1	7
	20%-40%	1	
	40-60%	2	
	60-80%	1	
	80-99%	1	
	No Response	1	
10-20ha	0-20%		10
	20%-40%	5	1
	40-60%	5	1
	60-80%	1	
	80-99%	1	
>20ha	0-20%	1	25
	20%-40%	10	6
	40-60%	12	4
	60-80%	14	
	80-99%	1	

Percentage of Farm Income derived from Direct Payments

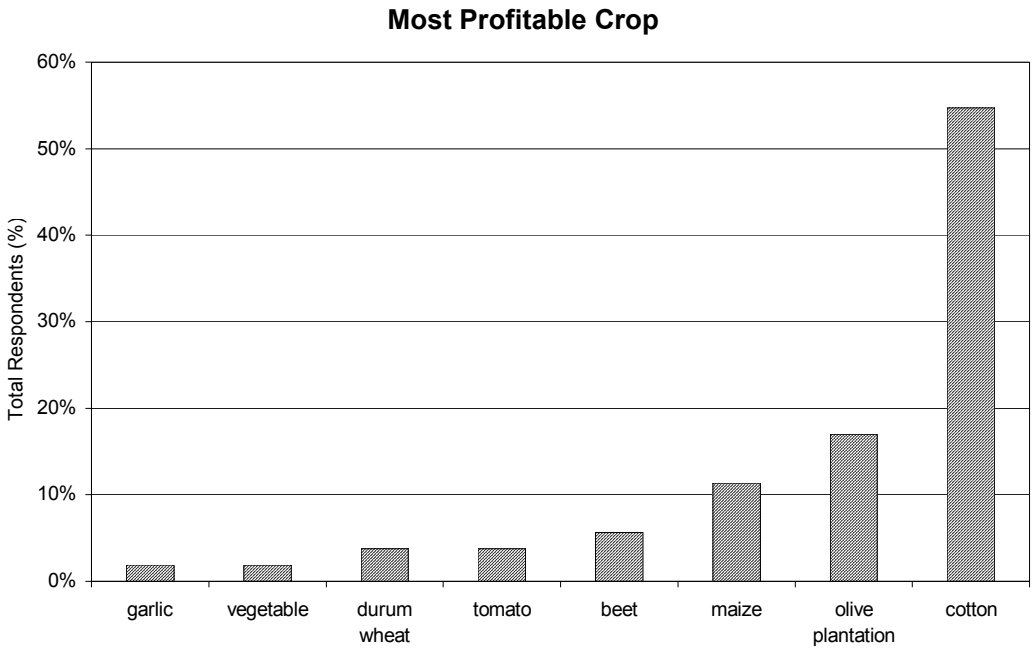


What percentage of farm income is derived from cotton production, including the cotton area payment (and excluding decoupled aid)?

Farm Size		2006	Five years ago
		Number	Number
<10ha	0-20%	1	3
	20%-40%	1	1
	60-80%	1	
	80-99%	1	
	100%	2	3
10-20ha	0-20%	1	1
	20%-40%	3	2
	40-60%	4	2
	60-80%	1	
	80-99%	1	3
	100%	2	4
>20ha	0-20%	8	4
	20%-40%	12	5
	40-60%	8	8
	60-80%	7	9
	80-99%	2	6
	100%	1	2



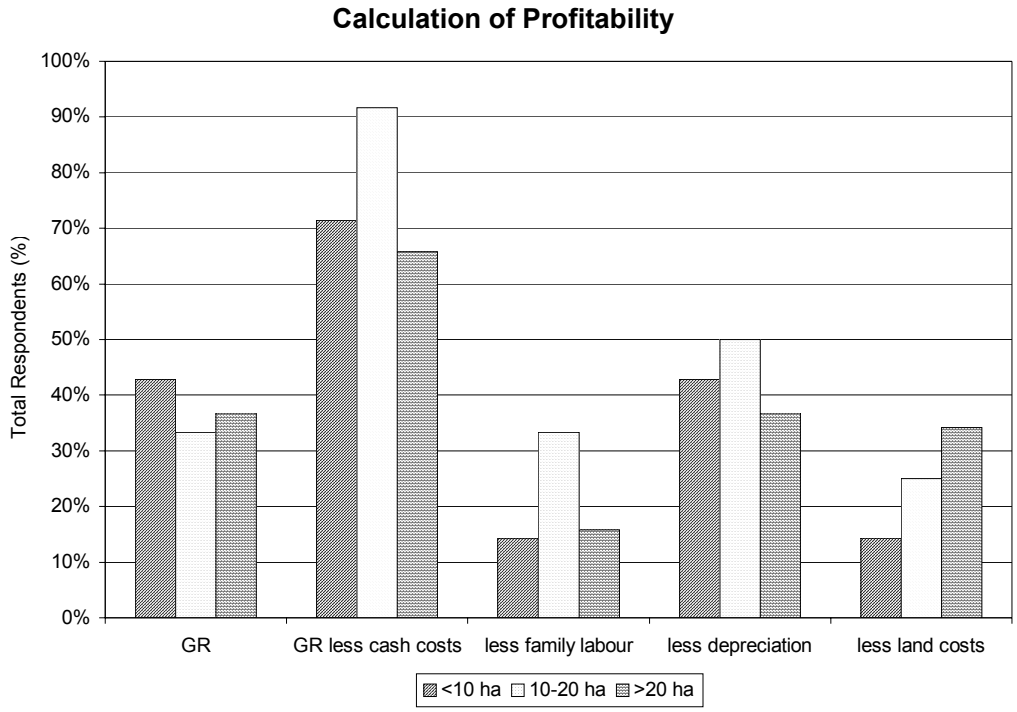
Which crop is the most profitable?



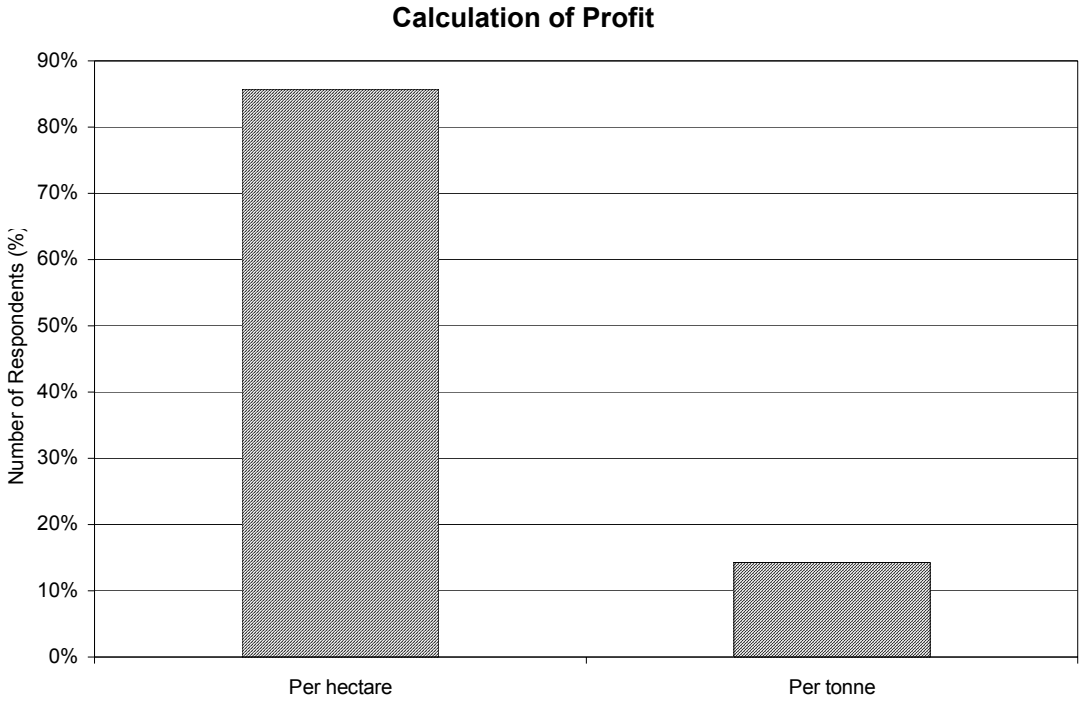
How do you calculate profits?

	GR	GR less cash costs	less family labour	less depreciation	less land costs
<10 ha	43%	71%	14%	43%	14%
10-20 ha	33%	92%	33%	50%	25%
>20 ha	37%	66%	16%	37%	34%

Note GR: Gross Margin



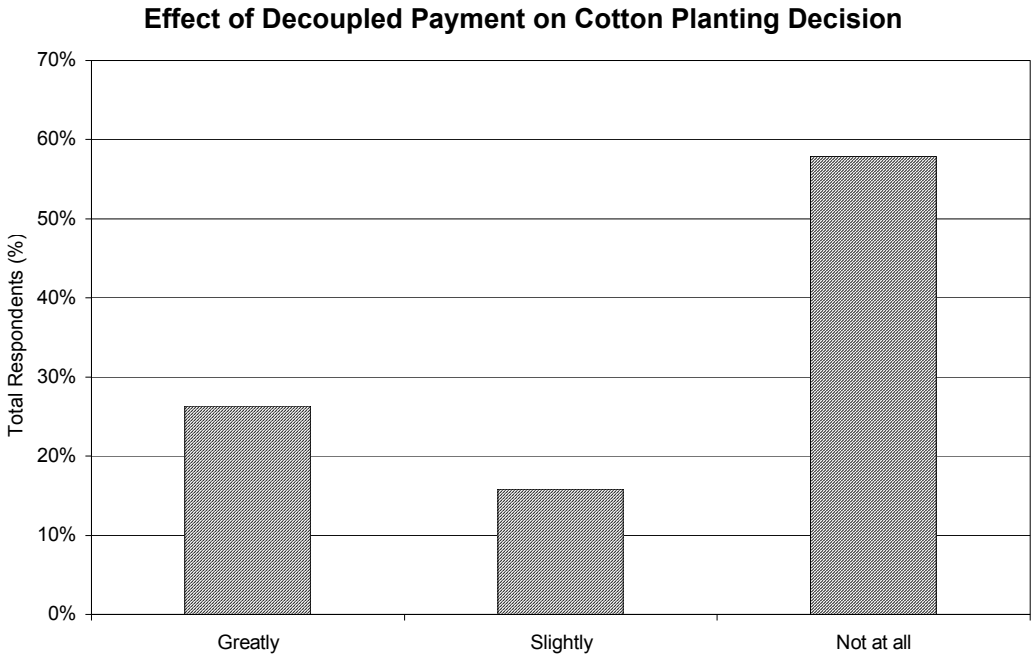
How is profitability judged?



QUESTION NUMBER 5: REGIME CHANGE IN 2006

Has the introduction of a payment which is not tied to the choice of crop (decoupled payment) affected how much cotton you plant?

Farm Size		Number
<10ha	Greatly	2
	Slightly	1
	Not at all	4
10-20ha	Greatly	5
	Slightly	4
	Not at all	3
>20ha	Greatly	8
	Slightly	4
	Not at all	26

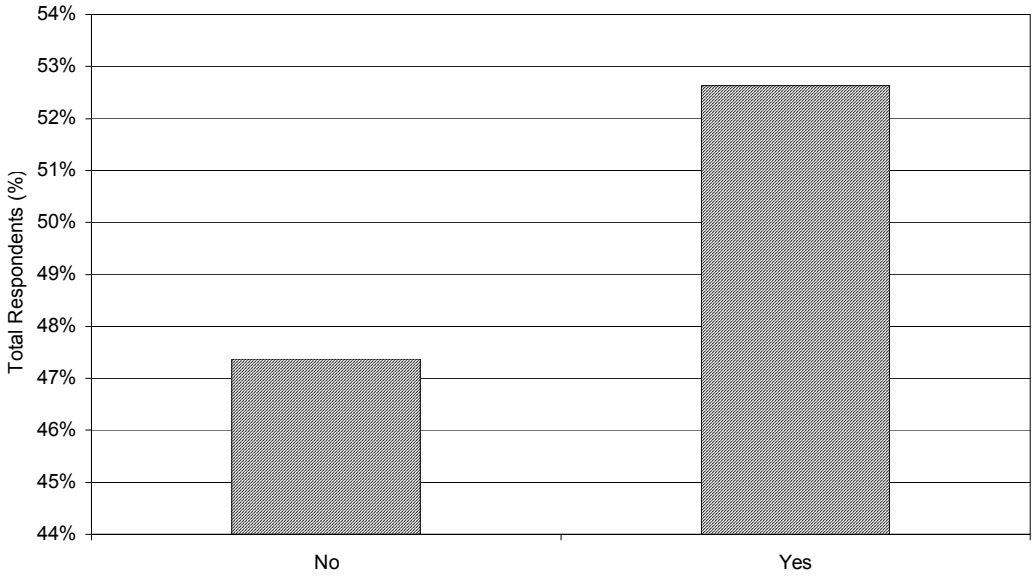

Effect of Decoupled Payment on Cotton Planting Decision
70%
60%
50%
40%
30%
20%
10%
0%
Total Respondents (%)
Greatly
Slightly
Not at all

If you choose not to plant cotton, what are the main alternatives you would consider seriously, including land abandonment?

Farm Size	Alternatives	No responses
<10ha	land abandonment	1
	maize	2
	maize, beet	1
	maize, sunflower	1
	olive plantation	1
	potatoes, durum wheat	1
10-20ha	artichoke	2
	durum wheat	1
	durum wheat, sunflower	2
	maize	2
	maize, sunflower	2
	olive plantation	1
	tomato	2
>20ha	beet, lucerne	1
	durum wheat	6
	durum wheat, maize	2
	durum wheat, sunflower	2
	land abandonment	5
	lucerne	2
	maize	6
	maize, durum wheat	1
	maize, garlic, asparagus	1
	maize,durum wheat, sunflower	1
	olive plantation	2
	olive plantation, asparagus	1
	olive plantation, walnut	1
	onion	1
	sunflower, durum wheat	1
	tomato	1
	vegetable	2
	wheat	1

Have you sought advice on alternative crops? If so, where?

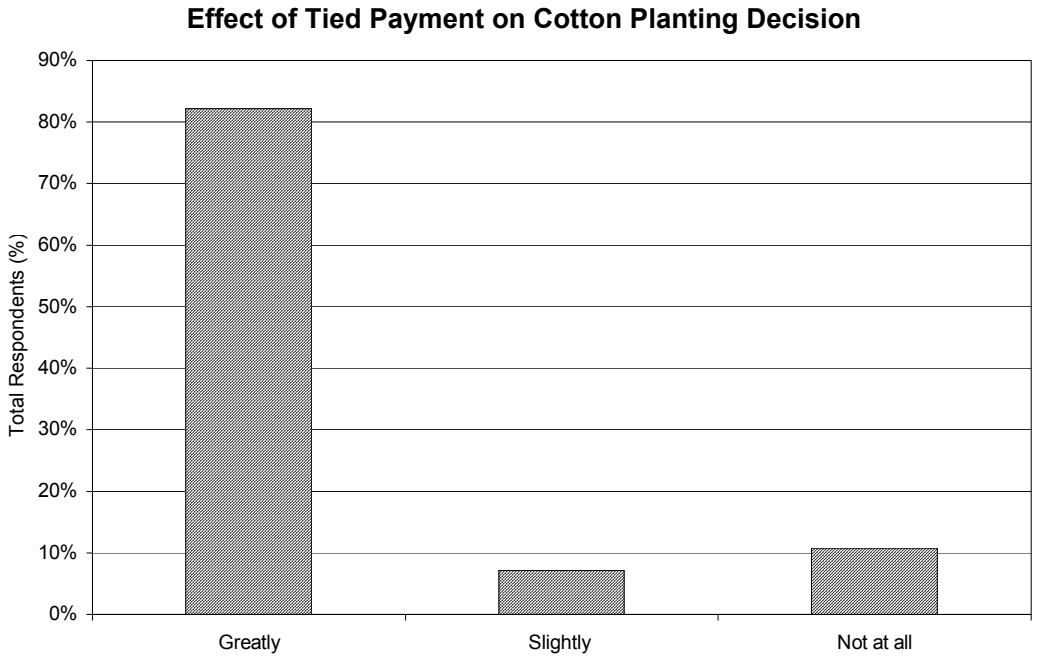
Farm Size		Responses
<10ha	No	3
	Yes	4
10-20ha	No	8
	Yes	4
>20ha	No	16
	Yes	22



Farm Size	Source of Advice	No responses
<10ha	partnership	4
10-20ha	cooperative	1
	partnership	3
>20ha	cooperative	6
	friends	6
	interview	1
	partnership	6

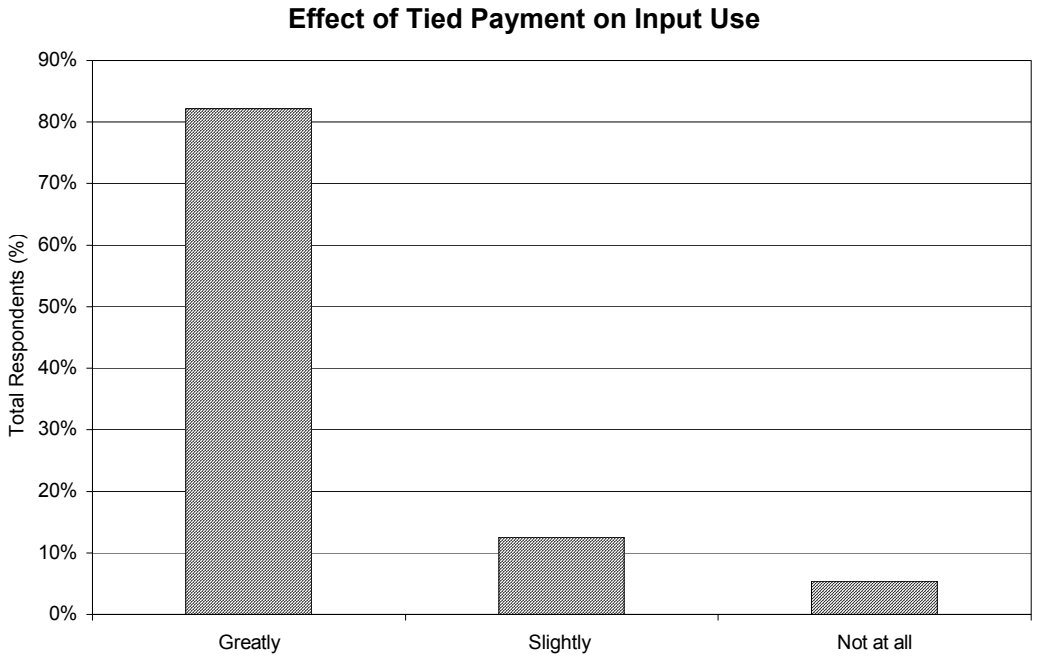
Has the introduction of a payment which is tied to the planting of cotton affected how much cotton you plant?

Farm Size	Influence of tied payment	No responses
<10ha	Greatly	6
10-20ha	Greatly	12
>20ha	Greatly	28
	Slightly	4
	Not at all	6



Has this payment affected input use?

Farm Size	Influnce on Input Use	No responses
<10ha	Greatly	5
	Not at all	1
10-20ha	Greatly	10
	Slightly	2
>20ha	Greatly	31
	Slightly	5
	Not at all	2



What would be the effect on the area you plant with cotton if the level of the payment which is tied to the planting of cotton were changed?

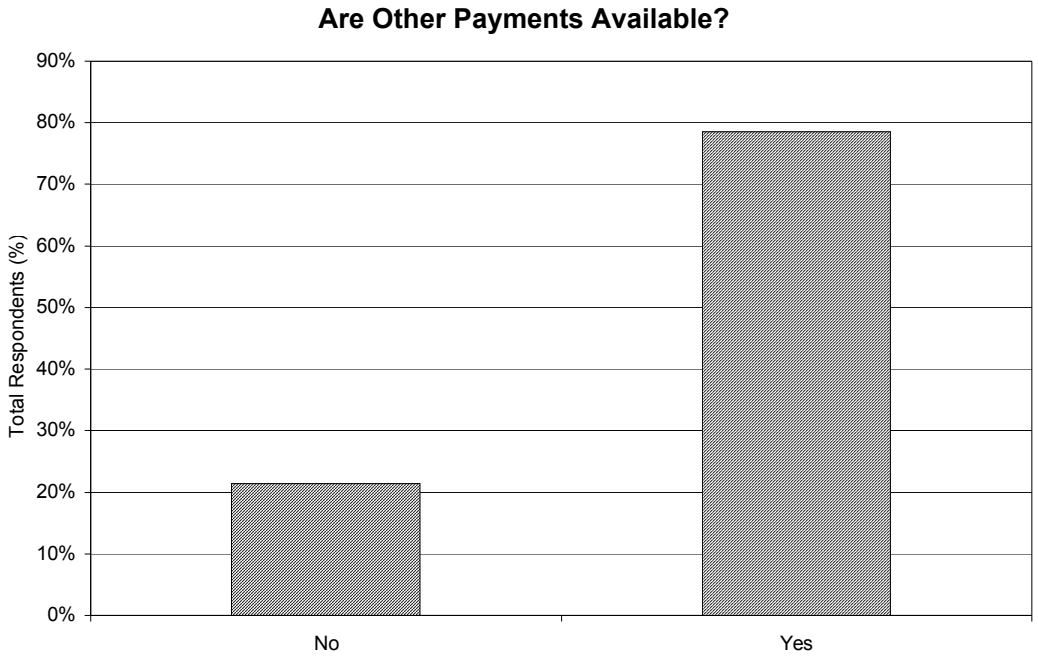
Relationship between Prices and Area

	Change in Coupled Payment									
Change in Area	50% rise	30% rise	20% rise	10% rise	0%	10% fall	20% fall	30% fall	50% fall	100% fall
Increase >30%	42	15	7	2		0	0	0	0	0
Increase 30%	6	11	3	0		0	0	0	0	0
Increase 20%	6	20	12	1		0	0	0	0	0
Increase 10%	0	4	21	17		0	0	0	0	0
no change	2	6	11	36	56	24	7	1	1	0
Decrease 10%	0	0	2	0		12	11	2	0	0
Decrease 20%	0	0	0	0		6	13	6	1	0
Decrease 30%	0	0	0	0		5	6	14	1	0
Decrease > 30%	0	0	0	0		9	19	33	53	56

Note: Price horizontal, Area Vertical.

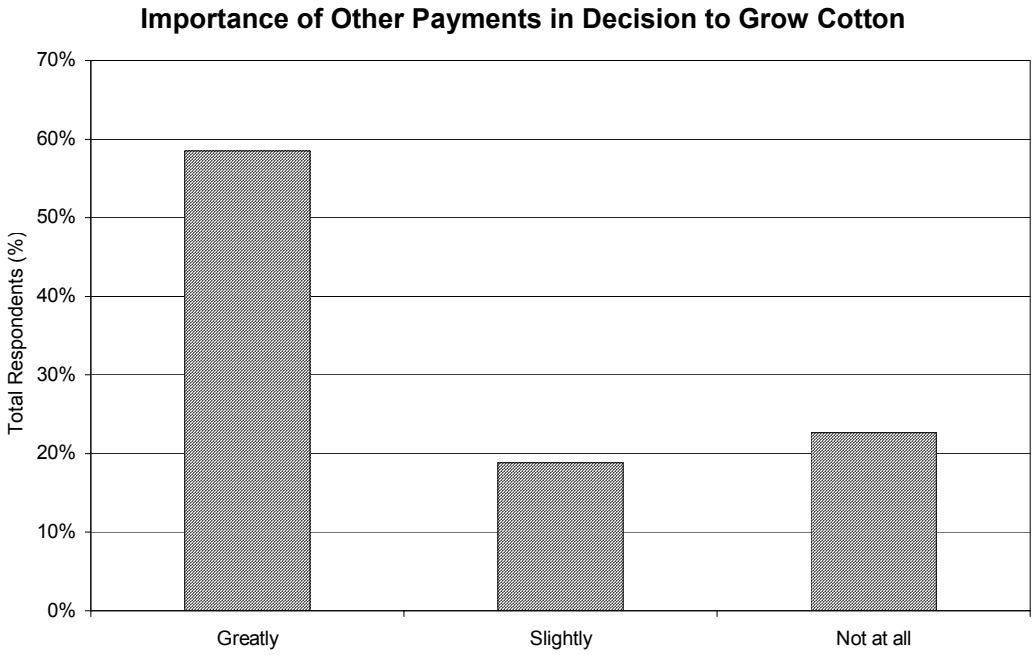
Are other payments available to you for growing cotton, i.e, payments for adopting certain environmental norms (agri-environmental programmes, e.g. integrated production)?

Farm Size		
<10ha	No	3
	Yes	3
10-20ha	No	4
	Yes	8
>20ha	No	5
	Yes	33



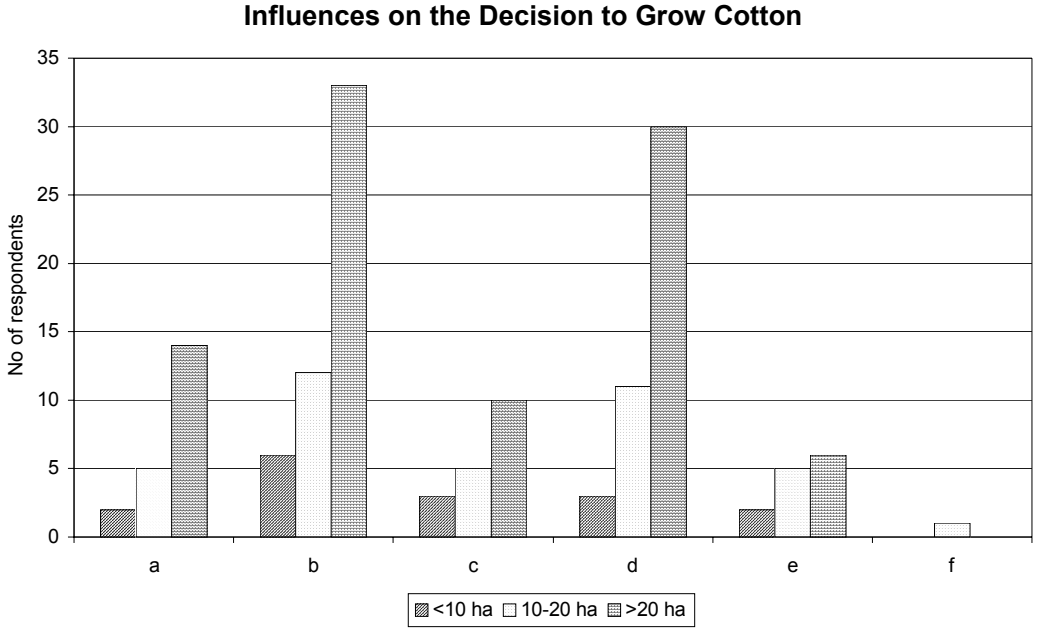
How important are these in your decision to grow cotton?

<10ha	Greatly	2
	Slightly	1
	Not at all	3
10-20ha	Greatly	5
	Slightly	5
	Not at all	1
>20ha	Greatly	24
	Slightly	4
	Not at all	8



What influences your decision to grow cotton?

(a = Price paid by the ginner, b = Cotton area payment, c = Direct payment, d = Agri-environmental payment, e = Price of other crops, f = Other)

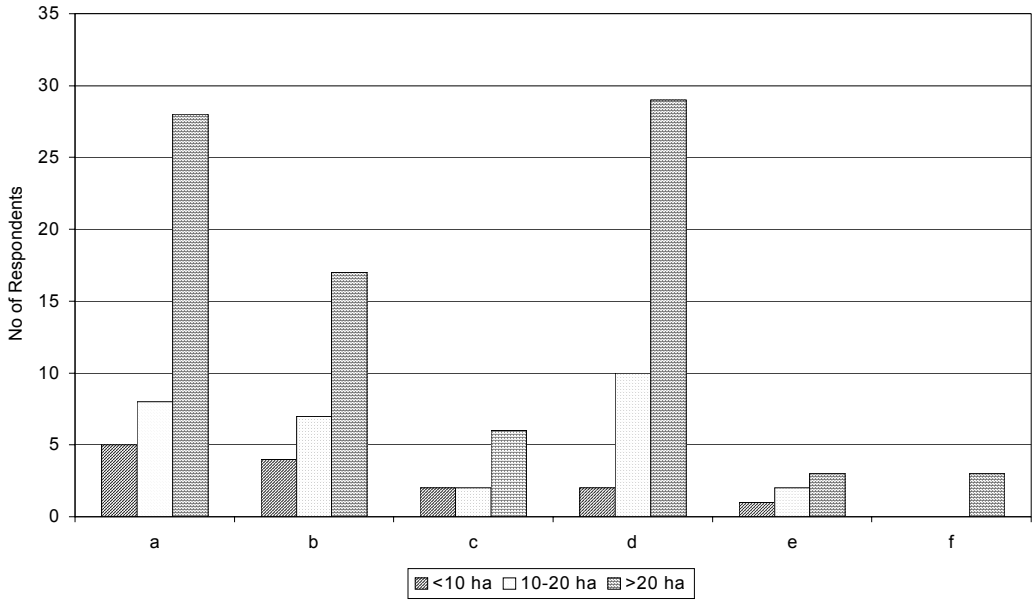


Farm Size	Influences	Number
<10ha	a-b-c-d	1
	a-b-c-e	1
	b	1
	b-c-e	1
	b-d	2
10-20ha	a-b-c-d	1
	a-b-c-d-e	1
	a-b-d	2
	a-b-d-e	1
	b	1
	b-c-d	1
	b-c-d-e	1
	b-c-d-e-f	1
	b-d	2
	b-d-e	1
>20ha	a	1
	a-b-c	2
	a-b-c-d	2
	a-b-c-d-e	2
	a-b-c-e	1
	a-b-d	6
	b	2
	b-c-d	1
	b-c-d-e	2
	b-d	14
	b-d-e	1
	d-e	2

What influences your decision to harvest your cotton crop?

(a = Price paid by the ginner, b = Cotton area payment, c = Direct payment, d = Agri-environmental payment, e = Price of other crops, f = Other)

Influences on the Decision to Harvest Cotton



Farm Size	Influences	Number
<10ha	a	2
	a-b-c	1
	a-b-c-d	1
	a-b-d	1
	b-e	1
10-20ha	a-b	1
	a-b-d	3
	a-b-d-f	1
	a-c-d	2
	a-d	1
	b-c-d	1
	b-e	1
	d	1
	d-e	1
>20ha	a	4
	a.b.d	1
	a-b	1
	a-b-c	1
	a-b-c-d	3
	a-b-d	6
	a-d	10
	a-f	2
	b-c-d	1
	b-c-d-e	1
	b-d	1
	b-d-e	2
	d	4
	f	1

Appendix 5: Greece Farmer Survey

TOTAL FARM AREA

Number of Farmers Surveyed

Area	Region	<5ha	5-10ha	10-20ha	>20ha	Total
Makedonia-Thraki	Drama	4	3		1	8
	Imathia	7	1	6	1	15
	Pella	6	5	2	2	15
	Rodopi	5	6	4	3	18
	Serres	3	5	4	4	16
	Thessaloniki	4	1	5	3	13
Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	5	4	4	1	14
	Karditsa	10	15	7	1	33
	Larissa	3	3	7	17	30
	Viotia	4	7	3	6	20
	Trikala	7	2		1	10
Total		58	52	42	40	192

Average Farm Size (ha)

Area	Region	<5ha	5-10ha	10-20ha	>20ha
Makedonia-Thraki	Drama	3.2	7.0		34.9
	Imathia	3.1	5.1	13.7	22.1
	Pella	2.0	7.4	12.0	26.7
	Rodopi	3.1	7.4	13.6	33.2
	Serres	3.8	7.8	12.6	34.2
	Thessaloniki	2.6	6.3	12.3	48.6
Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	3.6	7.1	13.7	22.1
	Karditsa	3.3	7.1	13.9	20.5
	Larissa	4.0	7.9	12.9	38.5
	Viotia	3.6	7.1	16.3	24.2
	Trikala	2.5	7.7		32.0

ANNUAL PRODUCTION OF COTTON

Average Area Under Cotton (hectares)

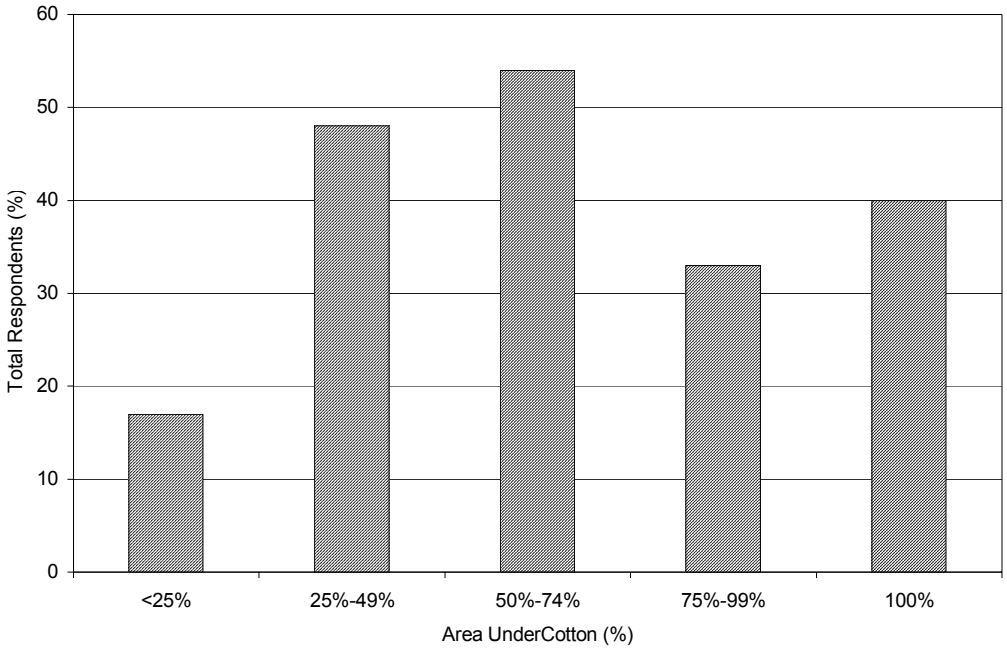
Farm Size	Area	Region	2006	2005	2004	2000
<5ha	Makedonia-Thraki	Drama	3.2	2.0	2.0	2.0
		Imathia	1.4	1.0	1.0	1.3
		Pella	1.5	1.6	1.5	1.1
		Rodopi	3.1	2.3	2.3	3.2
		Serres	1.8	2.0	1.7	1.7
		Thessaloniki	2.2	2.2	2.2	2.1
	Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	2.9	2.9	3.1	3.2
		Karditsa	2.4	2.3	2.4	2.6
		Larissa	2.4	3.3	3.3	3.4
		Viotia	2.8	2.7	2.1	2.6
		Trikala	2.3	2.1	2.1	2.3
5-10ha	Makedonia-Thraki	Drama	1.9	1.9	1.9	1.9
		Imathia	1.0	1.1	1.2	0.8
		Pella	5.3	5.1	5.0	5.0
		Rodopi	3.4	3.1	3.4	3.2
		Serres	3.1	3.3	3.8	3.5
		Thessaloniki	6.3	7.7	7.7	5.3
	Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	4.9	4.5	4.5	4.1
		Karditsa	5.5	5.6	5.8	5.6
		Larissa	4.2	5.2	5.4	4.9
		Viotia	5.3	5.0	4.7	4.0
10-20ha	Makedonia-Thraki	Imathia	6.7	5.4	5.7	4.5
		Pella	7.4	6.3	6.4	5.5
		Rodopi	2.7	2.6	2.9	1.6
		Serres	7.3	7.0	7.5	7.0
		Thessaloniki	7.2	7.5	7.4	5.3
	Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	11.1	10.1	10.2	7.6
		Karditsa	9.2	9.6	9.7	10.8
		Larissa	6.1	6.4	6.4	6.3
		Viotia	12.5	14.2	14.2	14.6
		Trikala	6.4	5.8	5.8	4.8
>20ha	Makedonia-Thraki	Drama	9.9	10.0	10.0	10.0
		Imathia	13.0	7.5	7.0	10.0
		Pella	19.0	18.4	18.7	14.5
		Rodopi	23.1	18.5	19.0	18.7
		Serres	12.4	11.9	11.8	11.3
		Thessaloniki	13.8	9.6	9.5	10.5
	Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	21.0	20.7	20.7	20.6
		Karditsa	10.5	10.0	10.0	0.0
		Larissa	18.2	18.8	18.6	15.2
		Viotia	12.4	10.1	10.0	10.8
		Trikala	20.5	20.0	20.0	13.4

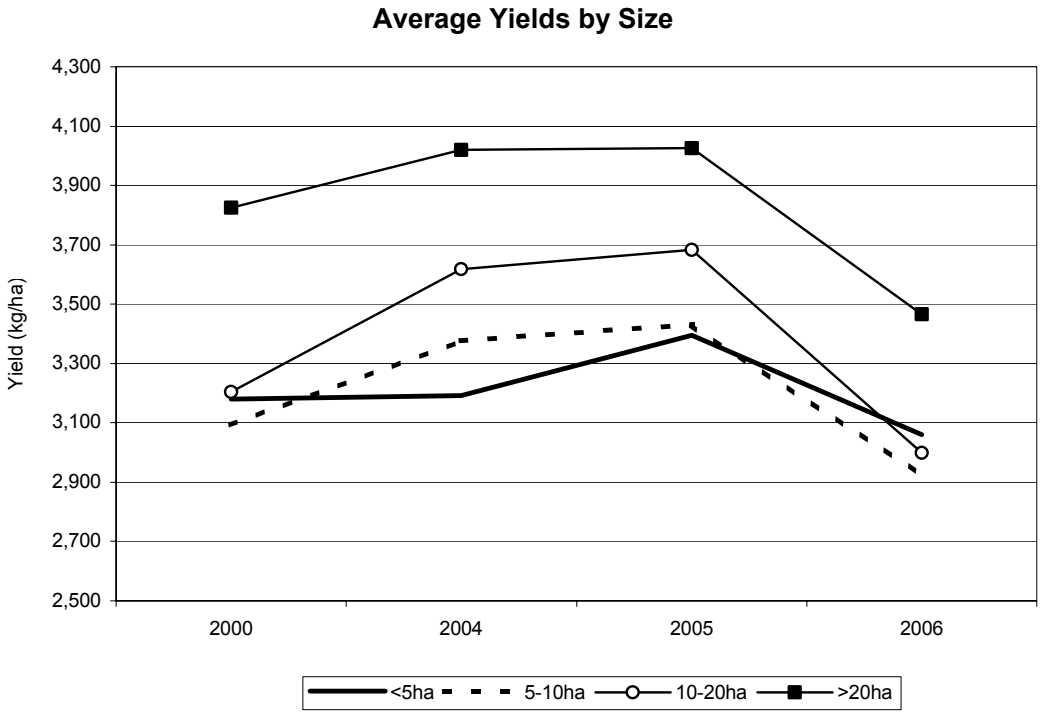
Cotton Area as % of Total

Area	Region	<5ha	5-10ha	10-20ha	>20ha
Makedonia-Thraki	Drama	100%	27%		28%
	Imathia	45%	20%	49%	59%
	Pella	76%	72%	62%	71%
	Rodopi	100%	46%	20%	70%
	Serres	49%	40%	58%	36%
	Thessaloniki	82%	100%	58%	28%
Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	81%	69%	81%	95%
	Karditsa	74%	78%	66%	51%
	Larissa	61%	54%	47%	47%
	Viotia	77%	76%	77%	51%
	Trikala	94%	83%		64%

Importance of Cotton to Total Area

Farm Size	Area under Cotton	No of responses
<5ha	<25%	1
	25%-49%	9
	50%-74%	14
	75%-99%	6
	100%	28
5-10ha	<25%	5
	25%-49%	13
	50%-74%	13
	75%-99%	12
	100%	9
10-20ha	<25%	4
	25%-49%	13
	50%-74%	13
	75%-99%	10
	100%	2
>20ha	<25%	7
	25%-49%	13
	50%-74%	14
	75%-99%	5
	100%	1


Cotton as % of Total Area
60
50
40
30
20
10
0
Total Respondents (%)
<25%
25%-49%
50%-74%
75%-99%
100%
Area UnderCotton (%)


Average Yields by Size
4,300
4,100
3,900
3,700
3,500
3,300
3,100
2,900
2,700
2,500
Yield (kg/ha)
2000
2004
2005
2006
<5ha
5-10ha
10-20ha
>20ha

Average Yields (kg/hectare)

Farm Size	Area	Region	2000	2004	2005	2006
<5ha	Makedonia-Thraki	Drama	3,050	3,050	3,125	2,625
		Imathia	2,657	1,971	1,907	2,326
		Pella	3,397	4,387	3,882	3,217
		Rodopi	3,160	2,900	3,020	4,220
		Serres	2,697	2,933	3,250	1,947
		Thessaloniki	4,060	3,563	3,755	3,385
	Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	3,344	3,250	3,548	2,682
		Karditsa	2,685	2,945	3,205	2,930
		Larissa	4,167	4,200	4,233	4,067
		Viotia	2,775	2,825	3,750	3,095
		Trikala	3,704	3,664	4,340	3,379
5-10ha	Makedonia-Thraki	Drama	3,733	4,000	3,933	2,667
		Imathia	2,700	2,930	2,900	1,500
		Pella	3,748	4,196	3,922	3,076
		Rodopi	2,300	3,123	3,057	2,667
		Serres	2,220	3,320	3,256	2,024
		Thessaloniki	3,700	3,500	3,800	3,000
		Trikala	3,530	4,080	4,255	3,700
	Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	3,530	2,548	2,655	3,075
		Karditsa	2,995	2,919	3,161	2,783
		Larissa	4,067	4,200	4,100	4,300
		Viotia	3,036	3,729	3,840	3,371
10-20ha	Makedonia-Thraki	Imathia	2,233	3,967	3,900	2,733
		Pella	3,750	3,700	4,250	3,750
		Rodopi	1,600	2,850	2,875	1,600
		Serres	2,738	3,200	3,125	1,550
		Thessaloniki	3,920	3,752	3,812	3,140
	Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	3,723	3,503	3,688	3,000
		Karditsa	3,000	3,183	3,427	2,979
		Larissa	4,086	4,271	4,214	4,243
		Viotia	4,067	3,883	3,833	3,733
>20ha	Makedonia-Thraki	Drama	4,500	5,100	4,500	2,100
		Imathia	4,500	4,200	5,000	3,100
		Pella	4,000	4,300	4,700	3,380
		Rodopi	2,600	2,633	2,667	2,383
		Serres	3,600	4,150	3,500	2,125
		Thessaloniki	4,500	4,067	4,173	3,267
	Ipiros-Peloponi /Thessalia /Sterea Ellas	Fthiotida	3,940	3,900	4,170	3,120
		Karditsa	2,500	3,000	3,500	2,800
		Larissa	3,976	4,253	4,265	4,271
		Viotia	3,792	3,867	3,933	3,275
		Trikala	3,500	3,800	3,850	3,070

Important Non-Cotton Crops

	No of responses
Cherry Trees	1
Clover	3
Durum Wheat/Wheat	80
Green beans	1
Maize	23
Melon	1
Oat	1
Olive Trees	7
Peach	7
Rice	7
Sugar beet	15
Table Tomato	2
Tobacco	3
Tomato - Industrial Use	10
Nil	31

QUESTION NUMBER 1: LABOUR USE

How many members of the household work on the farm (in 2006)?

Area	Farm Size	Total	Male	Female
Makedonia-Thraki	<5ha	1.50	0.97	0.53
	5-10ha	1.70	1.17	0.52
	10-20ha	1.38	1.19	0.19
	>20ha	1.87	1.40	0.47
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	1.97	1.15	0.82
	5-10ha	1.62	1.00	0.62
	10-20ha	1.67	1.19	0.48
	>20ha	1.32	1.05	0.27

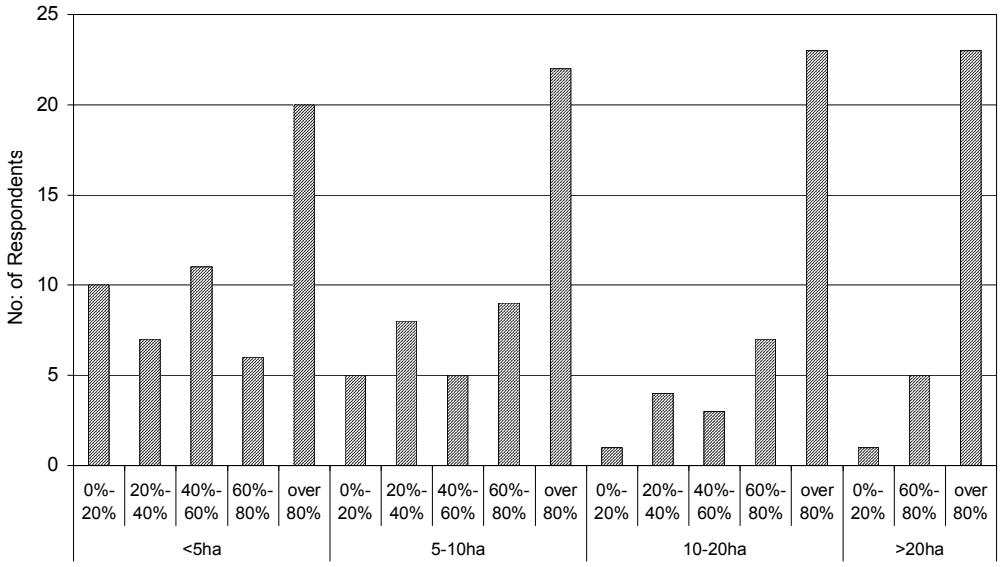
Of these, how many derive their main employment from the farm (in 2006?)

Area	Farm Size	Total	Male	Female
Makedonia-Thraki	<5ha	1.14	0.61	0.53
	5-10ha	1.01	0.62	0.39
	10-20ha	1.29	1.05	0.24
	>20ha	1.47	1.07	0.40
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	1.28	0.65	0.64
	5-10ha	1.40	0.85	0.55
	10-20ha	1.33	0.90	0.43
	>20ha	1.27	1.05	0.23

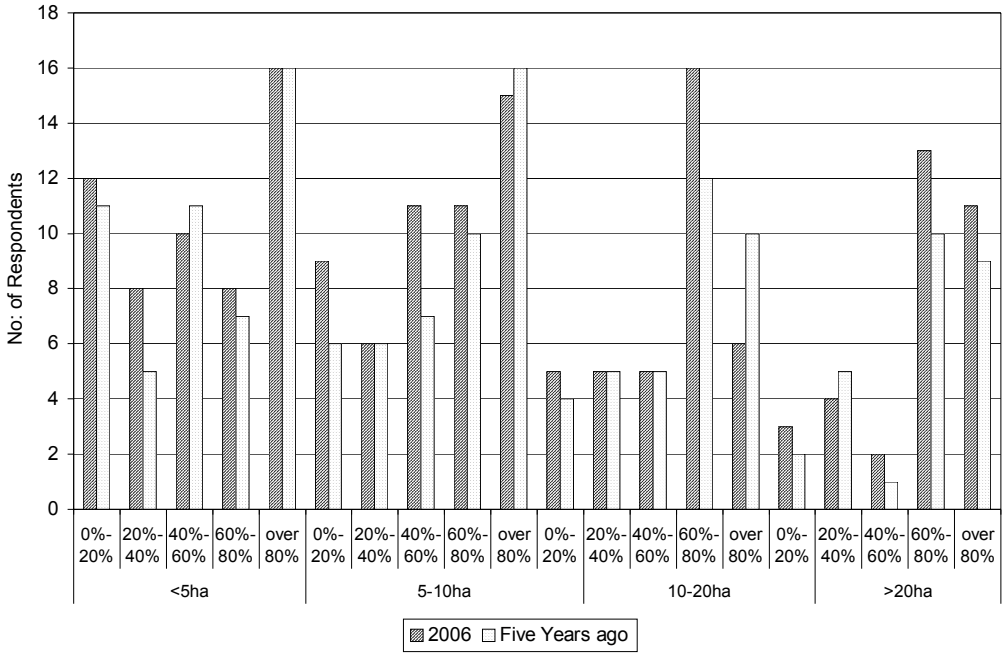
What percentage of farm household employment is derived from farm (as opposed to non-farm) activities?

Area	Farm Size	Employment from Farm Activities	Number	% of Group
Makedonia-Thraki	<5ha	0%-20%	10	29%
		20%-40%	3	9%
		40%-60%	7	20%
		60%-80%	5	14%
		over 80%	10	29%
	5-10ha	0%-20%	4	17%
		20%-40%	4	17%
		40%-60%	3	13%
		60%-80%	4	17%
		over 80%	8	35%
	10-20ha	0%-20%	1	5%
		20%-40%	3	14%
		40%-60%	1	5%
		60%-80%	2	10%
		over 80%	14	67%
	>20ha	0%-20%	1	7%
		60%-80%	3	20%
		over 80%	11	73%
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	20%-40%	4	21%
		40%-60%	4	21%
		60%-80%	1	5%
		over 80%	10	53%
	5-10ha	0%-20%	1	4%
		20%-40%	4	15%
		40%-60%	2	8%
		60%-80%	5	19%
		over 80%	14	54%
	10-20ha	20%-40%	1	6%
		40%-60%	2	12%
		60%-80%	5	29%
		over 80%	9	53%
	>20ha	60%-80%	2	14%
		over 80%	12	86%

Employment from Farm Activities



Employment Derived From Cotton Production



What percentage of household employment is derived from cotton production?

Area	Farm Size	Employment Derived From Cotton	2006	Five years ago
Makedonia-Thraki	<5ha	0%-20%	12	11
		20%-40%	4	4
		40%-60%	5	6
		60%-80%	3	1
		over 80%	11	11
	5-10ha	0%-20%	8	5
		20%-40%	2	3
		40%-60%	4	3
		60%-80%	3	4
		over 80%	6	6
	10-20ha	0%-20%	5	3
		20%-40%	4	5
		40%-60%	2	3
		60%-80%	6	6
		over 80%	2	3
	>20ha	0%-20%	2	1
		20%-40%	3	3
		60%-80%	5	4
		over 80%	5	4
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	20%-40%	4	1
		40%-60%	5	5
		60%-80%	5	6
		over 80%	5	5
	5-10ha	0%-20%	1	1
		20%-40%	4	3
		40%-60%	7	4
		60%-80%	8	6
		over 80%	9	10
	10-20ha	20%-40%	1	1
		40%-60%	3	2
		60%-80%	10	6
		over 80%	4	7
	>20ha	0%-20%	1	1
		20%-40%	1	2
		40%-60%	2	
		60%-80%	8	6
		over 80%	6	5

How many people are employed on the farm, in addition to household labour?

Area	Farm Size	Average	Max	Min
Makedonia-Thraki	<5ha	0.59	4	-
	5-10ha	1.68	6	-
	10-20ha	2.50	5	-
	>20ha	6.00	25	-
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	0.95	5	-
	5-10ha	1.93	10	-
	10-20ha	1.29	5	-
	>20ha	1.27	4	-

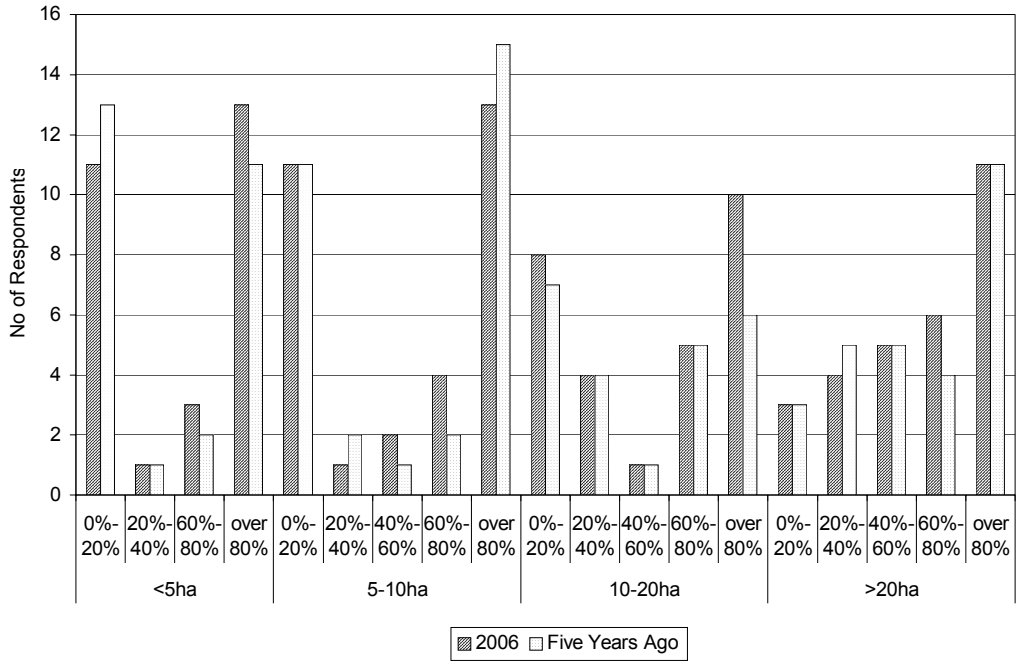
What is the proportion of full time and seasonal/casual labour among employed workers?

Area	Farm Size	Full time %
Makedonia-Thraki	<5ha	27%
	5-10ha	22%
	10-20ha	16%
	>20ha	14%
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	22%
	5-10ha	28%
	10-20ha	21%
	>20ha	22%

What percentage of employed labour time is spent on cotton production?

			No. of respondents	
Area	Farm Size	Employment on Cotton	2006	Five years ago
Makedonia-Thraki	<5ha	0%-20%	9	10
		over 80%	9	8
	5-10ha	0%-20%	6	6
		20%-40%	1	1
		40%-60%	1	
		over 80%	9	10
	10-20ha	0%-20%	5	4
		20%-40%	2	2
		60%-80%	3	3
		over 80%	5	3
	>20ha	0%-20%	2	2
		20%-40%	1	1
		40%-60%	3	3
		60%-80%	2	1
		over 80%	5	6
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	0%-20%	2	3
		20%-40%	1	1
		60%-80%	3	2
		over 80%	4	3
	5-10ha	0%-20%	5	5
		20%-40%		1
		40%-60%	1	1
		60%-80%	4	2
		over 80%	4	5
	10-20ha	0%-20%	3	3
		20%-40%	2	2
		40%-60%	1	1
		60%-80%	2	2
		over 80%	5	3
	>20ha	0%-20%	1	1
		20%-40%	3	4
		40%-60%	2	2
		60%-80%	4	3
		over 80%	6	5

Employed Labour Time Spent on Cotton Production



Do you contract out specific farm operations?

Farm Size	Contracting out operations	Number	% of Group
<5ha	All	4	8%
	Some	22	46%
	None	22	46%
5-10ha	Some	17	35%
	None	31	65%
10-20ha	Some	9	26%
	None	26	74%
>20ha	Some	4	11%
	None	32	89%

Are contracted services undertaken by a cooperative/partnership in which you are a participant?

Farm Size	Contract to coop	Number	% of Group
<5ha	No	18	100%
5-10ha	No	12	80%
	Yes	3	20%
10-20ha	No	8	80%
	Yes	2	20%
>20ha	No	4	80%
	Yes	1	20%

Where the farm is entirely contracted out, what is the basis for the payment for the use of land?

In all cases the basis for the arrangement was rent paid for the land.

How many days of labour were spent on cotton production during 2006 and 2005? (days refers to full days spend on cotton activities not partial days, partial days should be summed to give full day equivalents, i.e., 8 hours)

Farm Size	Labour	2006	2005	Change
<5ha	Household	11.4	11.2	2%
	Paid	4.0	5.0	-19%
	Contracted	3.6	3.1	14%
5-10ha	Household	11.0	9.9	11%
	Paid	3.7	4.1	-8%
	Contracted	0.7	0.8	-8%
10-20ha	Household	9.6	10.3	-7%
	Paid	3.4	2.8	22%
	Contracted	3.2	3.8	-15%
>20ha	Household	9.1	10.1	-10%
	Paid	3.6	3.6	0%
	Contracted	3.4	3.6	-7%

What is the cost to you (including non-wage benefits) of employed labour per annum?

Labour	€ per annum
Skilled	5,049
Unskilled	1,750

Note: Based on total wage cost divided by number of employees, with the assumption that skilled workers are full time employees.

What is the cost of contracted services for cotton?

Activity	€ per ha
Land Preparation	99
Planting	37
Irrigation	107
Fertiliser	94
Herbicides	180
Insecticide	110
Harvesting	288

QUESTION NUMBER 2: COTTON PRODUCTION

How has your total farmed area changed since 2000?

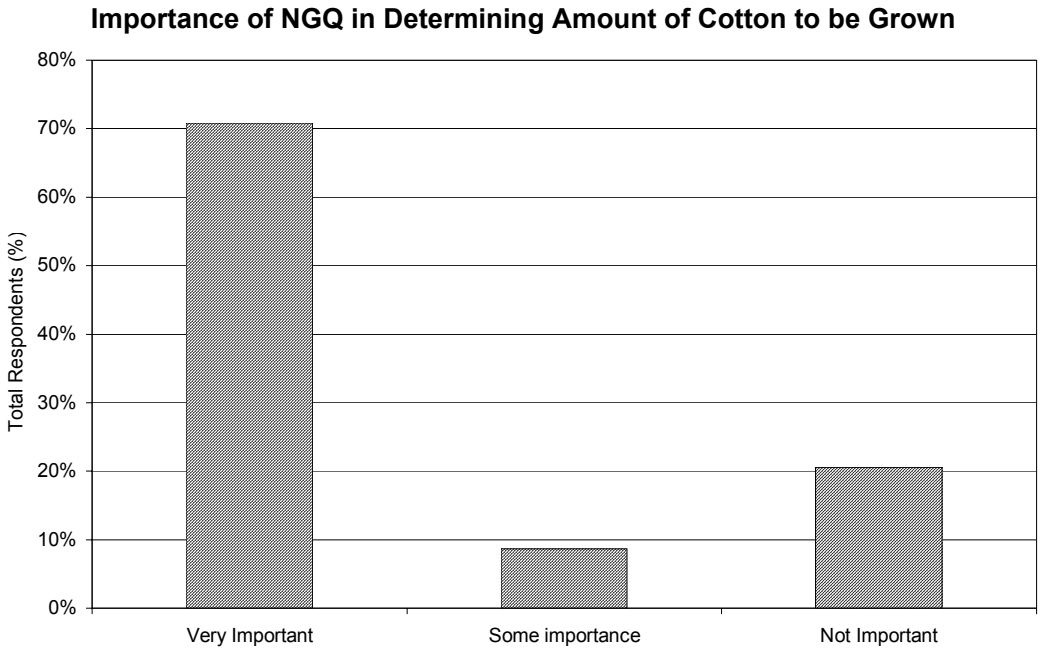
Area	Farm Size	Change	2006 v 2005	2005 v 2000
Makedonia-Thraki	<5ha	>50% increase	4	4
		25% to 50% increase	1	
		<25% increase	4	4
		No change	23	18
		<25% decrease	4	9
		25% to 50% decrease		1
	5-10ha	>50% increase	1	3
		25% to 50% increase	2	2
		<25% increase	7	2
		No change	8	12
		<25% decrease	5	4
	10-20ha	>50% increase	1	3
		25% to 50% increase		1
		<25% increase	5	5
		No change	8	4
		<25% decrease	6	7
		25% to 50% decrease	1	1
	>20ha	>50% increase	2	3
		25% to 50% increase	1	2
		<25% increase	8	4
		No change	1	2
		<25% decrease	2	3
		25% to 50% decrease	1	1
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	25% to 50% increase		1
		<25% increase	2	1
		No change	16	11
		<25% decrease	1	2
		25% to 50% decrease	2	3
		>50% decrease		1
	5-10ha	>50% increase	1	3
		25% to 50% increase	1	5
		<25% increase	6	5
		No change	13	11
		<25% decrease	4	3
		25% to 50% decrease	4	1
		>50% decrease		1
	10-20ha	>50% increase	1	2
		25% to 50% increase	1	2
		<25% increase	4	5
		No change	8	5
		<25% decrease	4	4
		25% to 50% decrease	2	2
	>20ha	>50% increase	2	4
		25% to 50% increase	1	4
		<25% increase	5	2
		No change	3	3
		<25% decrease	7	6
		25% to 50% decrease	3	3
		>50% decrease	1	

How has your cotton area changed since 2000?

Area	Farm Size	Change	2006 v 2005	2005 v 2000
Makedonia-Thraki	<5ha	>50% increase	5	3
		25% to 50% increase	2	1
		<25% increase	4	3
		No change	21	20
		<25% decrease	4	4
		25% to 50% decrease		2
		>50% decrease		2
	5-10ha	>50% increase		1
		25% to 50% increase	1	2
		<25% increase	4	4
		No change	10	9
		<25% decrease	7	4
		25% to 50% decrease	1	2
		>50% decrease		1
	10-20ha	>50% increase	2	4
		<25% increase	3	3
		No change	8	8
		<25% decrease	7	3
		25% to 50% decrease		3
	>20ha	>50% increase	4	1
		25% to 50% increase		3
		<25% increase	4	4
		No change	3	3
		<25% decrease	4	4
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	25% to 50% increase		2
		<25% increase	4	
		No change	14	9
		<25% decrease	3	4
		25% to 50% decrease		4
		>50% decrease		1
	5-10ha	>50% increase	1	2
		25% to 50% increase	3	1
		<25% increase	1	8
		No change	16	9
		<25% decrease	6	6
		25% to 50% decrease	2	2
		>50% decrease		1
	10-20ha	>50% increase	1	1
		<25% increase	6	5
		No change	5	5
		<25% decrease	5	7
		25% to 50% decrease	3	1
	>20ha	>50% increase	1	1
		25% to 50% increase	2	5
		<25% increase	6	4
		No change	4	3
		<25% decrease	9	6
		25% to 50% decrease		1
		>50% decrease		1

How important was the “National Guaranteed Quantity (NGQ)” in determining the amount of cotton to be grown?

Area	Farm Size	Importance of NGQ	Number
Makedonia-Thraki	<5ha	Very Important	32
		Some importance	2
		Not Important	1
		(blank)	1
	5-10ha	Very Important	18
		Some importance	3
		Not Important	1
		(blank)	1
	10-20ha	Very Important	17
		Some importance	2
		Not Important	2
	>20ha	Very Important	13
		(blank)	2
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Very Important	5
		Some importance	5
		Not Important	12
	5-10ha	Very Important	14
		Some importance	2
		Not Important	13
	10-20ha	Very Important	12
		Some importance	1
		Not Important	8
	>20ha	Very Important	20
		Some importance	1
		Not Important	1
		(blank)	3

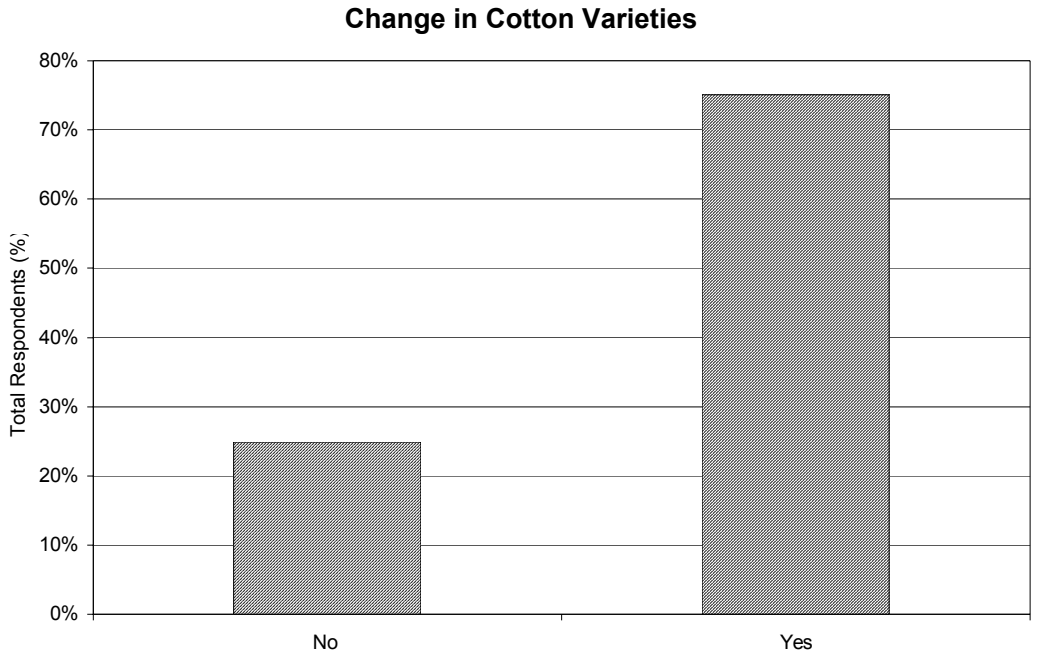


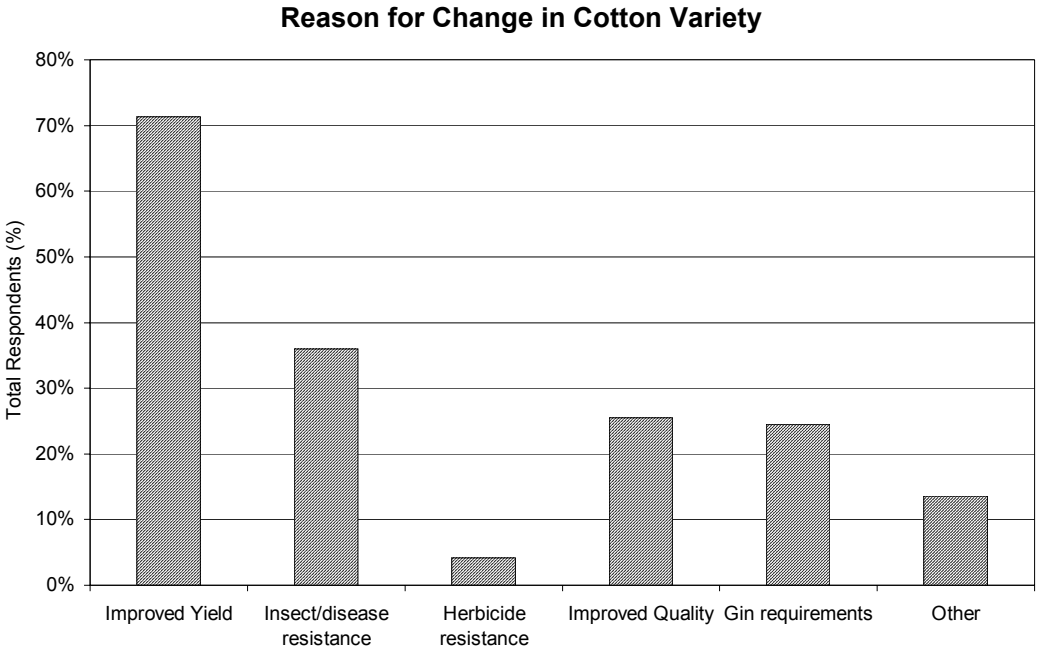
Has the variety of cotton grown changed over the last five years?

Farm Size	Response	Number
<5ha	No	24
	Yes	34
5-10ha	No	12
	Yes	40
10-20ha	No	6
	Yes	36
>20ha	No	5
	Yes	32

If so [yes], why? (tick the box, you can select more than one response)

Farm Size	Response	Improved Yield	Insect/disease resistance	Herbicide resistance	Improved Quality	Gin requirements	Other
<5ha	No		7	12	11	11	13
	Yes	32	14	3	8	12	4
	No response	26	37	43	39	35	41
5-10ha	No		8	9	7	8	10
	Yes	39	15	3	16	11	5
	No response	13	29	40	29	33	37
10-20ha	No	3	11	16	12	16	7
	Yes	33	15	1	10	7	11
	No response	6	16	25	20	19	24
>20ha	No	2	5	10	5	7	9
	Yes	33	25	1	15	17	6
	No response	5	10	29	20	16	25

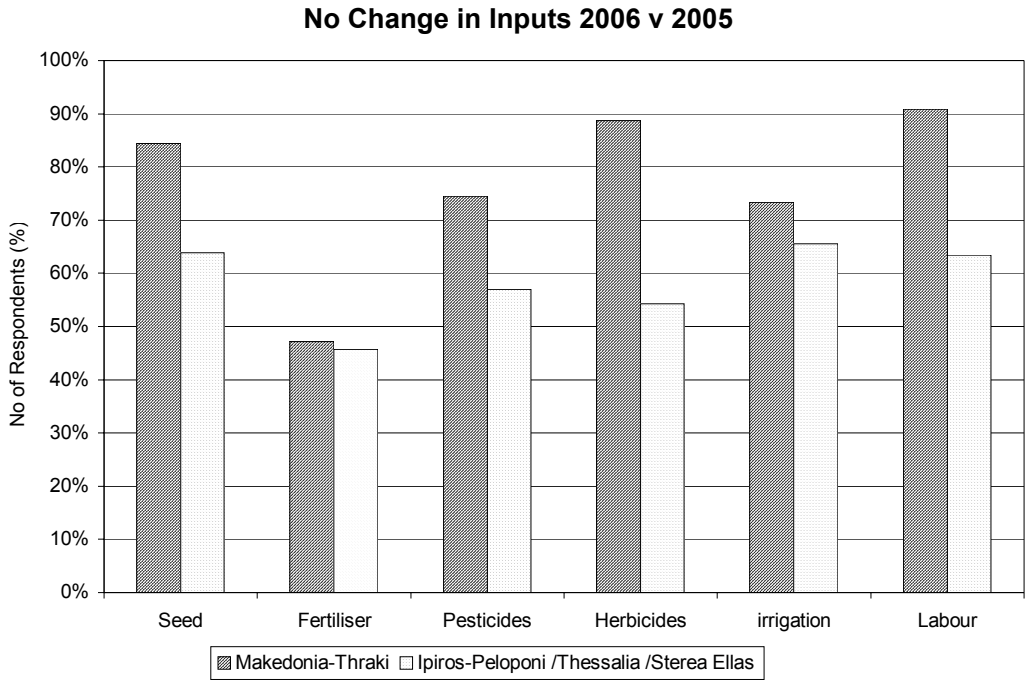

Change in Cotton Varieties
80%
70%
60%
50%
40%
30%
20%
10%
0%
Total Respondents (%)
No
Yes


Reason for Change in Cotton Variety
80%
70%
60%
50%
40%
30%
20%
10%
0%
Total Respondents (%)
Improved Yield
Insect/disease resistance
Herbicide resistance
Improved Quality
Gin requirements
Other

Who provides seed, fertiliser, chemicals etc, for growing cotton?

Farm Size	Provider	Number	%
<5ha	Cooperative	40	69%
	Ginners	15	26%
	No response	3	5%
5-10ha	Cooperative	35	67%
	Ginners	1	2%
	Other	15	29%
	No response	1	2%
10-20ha	Cooperative	23	55%
	Other	16	38%
	No response	3	7%
>20ha	Cooperative	20	50%
	Ginners	3	8%
	Other	13	33%
	No response	4	10%

How has your use of inputs per hectare for cotton changed since 2000 (in percentage or quantity terms, not both)?



Change in Inputs 2006 v 2005

Area	Farm Size		Seed	Fertiliser	Pesticides	Herbicides	Irrigation	Labour
Makedonia-Thraki	<5ha	25% to 50% increase	3%	3%	3%	24%	6%	7%
		<25% increase	3%	21%	23%	0%	3%	21%
		No change	87%	72%	47%	48%	61%	45%
		<25% decrease	6%	3%	20%	14%	26%	24%
		25% to 50% decrease	0%	0%	7%	14%	3%	3%
		>50% decrease	0%	0%	0%	0%	0%	0%
	5-10ha	25% to 50% increase	0%	0%	0%	30%	0%	0%
		<25% increase	0%	30%	30%	0%	0%	30%
		No change	96%	52%	43%	35%	83%	43%
		<25% decrease	4%	17%	13%	26%	13%	22%
		25% to 50% decrease	0%	0%	13%	9%	4%	4%
	10-20ha	>50% increase	0%	17%	0%	11%	0%	6%
		25% to 50% increase	0%	0%	0%	28%	0%	17%
		<25% increase	24%	39%	29%	0%	0%	22%
		No change	67%	39%	57%	56%	81%	56%
		<25% decrease	10%	6%	5%	6%	19%	0%
		25% to 50% decrease	0%	0%	5%	0%	0%	0%
		>50% decrease	0%	0%	5%	0%	0%	0%
	>20ha	>50% increase	0%	0%	0%	0%	0%	0%
		25% to 50% increase	7%	7%	7%	40%	7%	7%
		<25% increase	0%	40%	33%	0%	0%	33%
		No change	87%	40%	40%	27%	80%	40%
		<25% decrease	7%	7%	20%	20%	13%	20%
		25% to 50% decrease	0%	7%	0%	13%	0%	0%
		>50% decrease	0%	0%	0%	0%	0%	0%
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	>50% increase	0%	0%	0%	0%	0%	0%
		25% to 50% increase	0%	48%	0%	48%	0%	45%
		<25% increase	45%	14%	45%	14%	43%	15%
		No change	55%	29%	41%	24%	52%	25%
		<25% decrease	0%	5%	14%	5%	5%	10%
		25% to 50% decrease	0%	5%	0%	10%	0%	5%
	5-10ha	>50% increase	0%	0%	0%	0%	0%	0%
		25% to 50% increase	0%	54%	0%	54%	0%	54%
		<25% increase	52%	11%	52%	11%	52%	11%
		No change	48%	18%	31%	14%	41%	29%
		<25% decrease	0%	18%	17%	11%	7%	7%
		25% to 50% decrease	0%	0%	0%	11%	0%	0%
	10-20ha	>50% increase	0%	0%	0%	0%	0%	0%
		25% to 50% increase	0%	33%	0%	33%	0%	33%
		<25% increase	33%	33%	33%	33%	33%	33%
		No change	67%	29%	43%	10%	62%	29%
		<25% decrease	0%	5%	14%	19%	5%	5%
		25% to 50% decrease	0%	0%	10%	5%	0%	0%
	>20ha	25% to 50% increase	0%	5%	0%	4%	0%	4%
		<25% increase	5%	64%	5%	56%	5%	60%
		No change	91%	18%	73%	20%	77%	28%
		<25% decrease	5%	14%	18%	16%	18%	4%
		25% to 50% decrease	0%	0%	5%	4%	0%	4%

Change in Inputs 2005 v 2000

Area	Farm Size		Seed	Fertiliser	Pesticides	Herbicides	Irrigation	Labour
Makedonia-Thraki	<5ha	25% to 50% increase	3%	3%	24%	6%	7%	7%
		<25% increase	21%	23%	0%	3%	21%	0%
		No change	72%	47%	48%	61%	45%	87%
		<25% decrease	3%	20%	14%	26%	24%	7%
		25% to 50% decrease	0%	7%	14%	3%	3%	0%
		>50% decrease	0%	0%	0%	0%	0%	0%
	5-10ha	25% to 50% increase	0%	0%	30%	0%	0%	0%
		<25% increase	30%	30%	0%	0%	30%	0%
		No change	52%	43%	35%	83%	43%	100%
		<25% decrease	17%	13%	26%	13%	22%	0%
		25% to 50% decrease	0%	13%	9%	4%	4%	0%
	10-20ha	>50% increase	17%	0%	11%	0%	6%	0%
		25% to 50% increase	0%	0%	28%	0%	17%	0%
		<25% increase	39%	29%	0%	0%	22%	0%
		No change	39%	57%	56%	81%	56%	81%
		<25% decrease	6%	5%	6%	19%	0%	19%
		25% to 50% decrease	0%	5%	0%	0%	0%	0%
		>50% decrease	0%	5%	0%	0%	0%	0%
	>20ha	>50% increase	0%	0%	0%	0%	0%	0%
		25% to 50% increase	7%	7%	40%	7%	7%	7%
		<25% increase	40%	33%	0%	0%	33%	0%
		No change	40%	40%	27%	80%	40%	87%
		<25% decrease	7%	20%	20%	13%	20%	7%
		25% to 50% decrease	7%	0%	13%	0%	0%	0%
		>50% decrease	0%	0%	0%	0%	0%	0%
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	>50% increase	0%	0%	0%	0%	0%	0%
		25% to 50% increase	48%	0%	48%	0%	45%	0%
		<25% increase	14%	45%	14%	43%	15%	45%
		No change	29%	41%	24%	52%	25%	50%
		<25% decrease	5%	14%	5%	5%	10%	5%
		25% to 50% decrease	5%	0%	10%	0%	5%	0%
	5-10ha	>50% increase	0%	0%	0%	0%	0%	0%
		25% to 50% increase	54%	0%	54%	0%	54%	0%
		<25% increase	11%	52%	11%	52%	11%	52%
		No change	18%	31%	14%	41%	29%	34%
		<25% decrease	18%	17%	11%	7%	7%	14%
		25% to 50% decrease	0%	0%	11%	0%	0%	0%
	10-20ha	>50% increase	0%	0%	0%	0%	0%	0%
		25% to 50% increase	33%	0%	33%	0%	33%	0%
		<25% increase	33%	33%	33%	33%	33%	33%
		No change	29%	43%	10%	62%	29%	62%
		<25% decrease	5%	14%	19%	5%	5%	5%
		25% to 50% decrease	0%	10%	5%	0%	0%	0%
	>20ha	25% to 50% increase	5%	0%	4%	0%	4%	0%
		<25% increase	64%	5%	56%	5%	60%	5%
		No change	18%	73%	20%	77%	28%	77%
		<25% decrease	14%	18%	16%	18%	4%	18%
		25% to 50% decrease	0%	5%	4%	0%	4%	0%

Has your investment in farm machinery changed over the last five years?

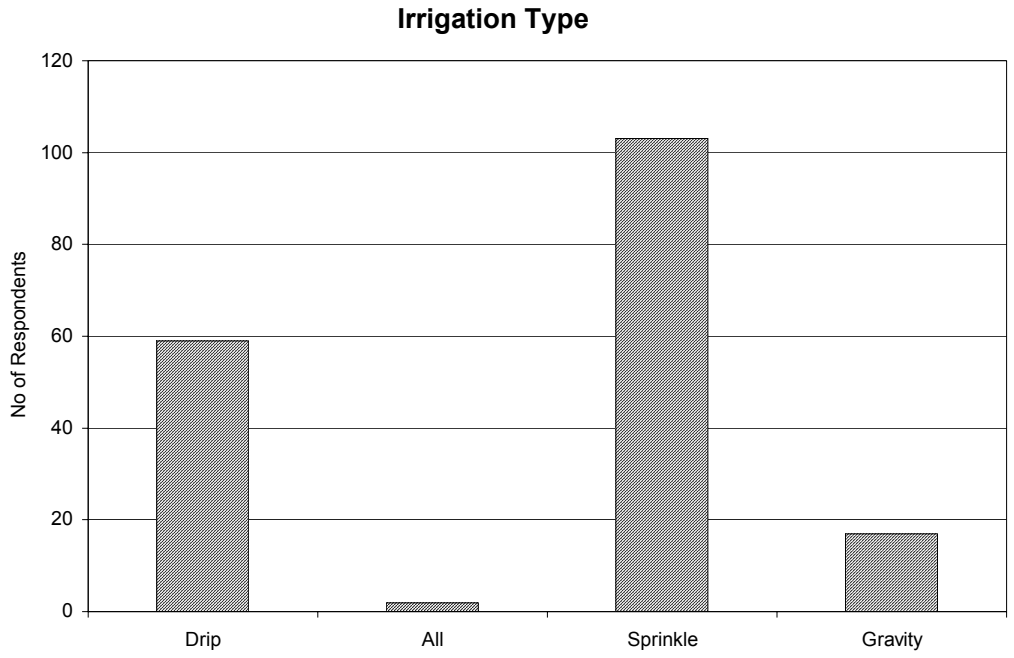
Area	Farm Size	Investment	Number	%
Makedonia-Thraki	<5ha	Increase	4	11%
		Unchanged	31	86%
		Decrease	1	3%
	5-10ha	Increase	7	30%
		Unchanged	16	70%
	10-20ha	Increase	11	52%
		Unchanged	8	38%
		Decrease	1	5%
		No response	1	5%
	>20ha	Increase	11	73%
		Unchanged	4	27%
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Increase	3	14%
		Unchanged	16	73%
		Decrease	1	5%
		No response	2	9%
	5-10ha	Increase	9	31%
		Unchanged	19	66%
		Decrease	1	3%
	10-20ha	Increase	8	38%
		Unchanged	11	52%
		Decrease	2	10%
	>20ha	Increase	14	56%
		Unchanged	8	32%
		No response	3	12%

What proportion of the cotton area is irrigated?

		Number of respondents	
Farm Size	Proportion Irrigated Area	2006	2005
<5ha	80% to 99%	3	3
	100%	51	50
5-10ha	60% to 80%	2	2
	80% to 99%	1	0
	100%	48	47
10-20ha	100%	42	41
>20ha	0% to 20%	1	0
	20% to 40%	0	1
	100%	35	35

How do you irrigate?

Farm Size	Irrigation Type	Number	% of Size
<5ha	Drip	11	20%
	All	1	2%
	Sprinkle	36	64%
	Gravity	8	14%
5-10ha	Drip	13	25%
	All	1	2%
	Sprinkle	35	67%
	Gravity	3	6%
10-20ha	Drip	14	38%
	All	1	3%
	Sprinkle	20	54%
	Gravity	2	5%
>20ha	Drip	21	57%
	Sprinkle	12	32%
	Gravity	4	11%



Has this changed over the last five years?

Only 11 respondents reported changing irrigation types. In all cases, sprinkle or gravity has changed to drip.

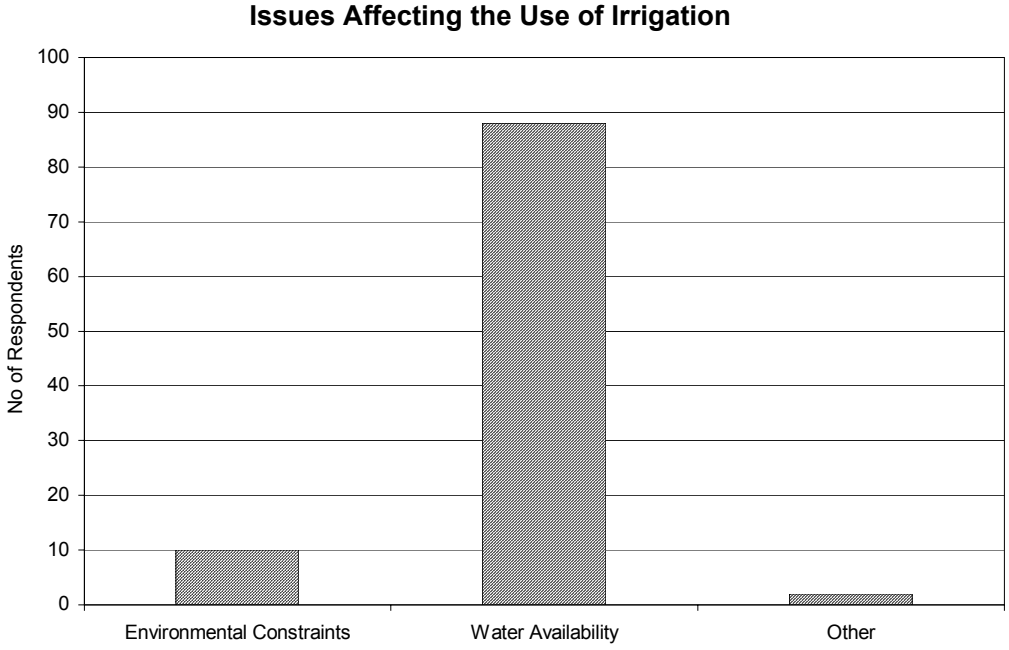
What proportion of the cotton area is under plastic?

In all cases less than 20% of cotton was under plastic in 2006.

Has the use of irrigation over the past 5 years was affected by:

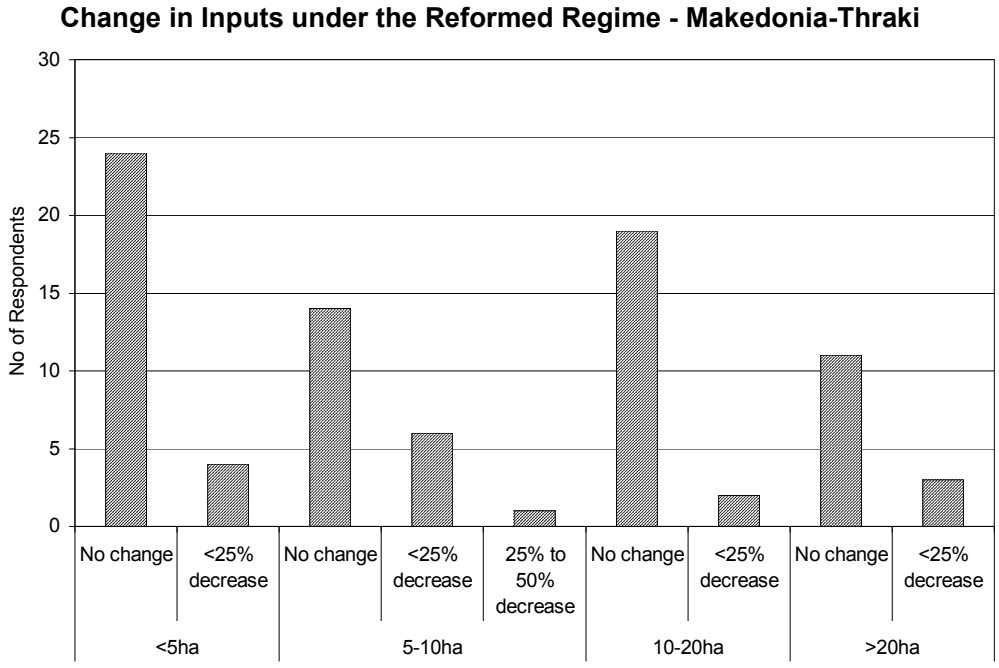
Environmental constraints *Water availability* *Other factors*

Area	Farm Size	Issue	Number
Makedonia-Thraki	<5ha	Water Availability	12
		Other	1
		No Response	23
	5-10ha	Environmental Constraints	2
		Water Availability	8
		No Response	13
	10-20ha	Water Availability	2
		No Response	19
	>20ha	Water Availability	3
		No Response	12
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Environmental Constraints	2
		Water Availability	15
		No Response	5
	5-10ha	Water Availability	19
		Other	1
		No Response	9
	10-20ha	Environmental Constraints	3
		Water Availability	10
		No Response	8
	>20ha	Environmental Constraints	3
		Water Availability	19
		No Response	3

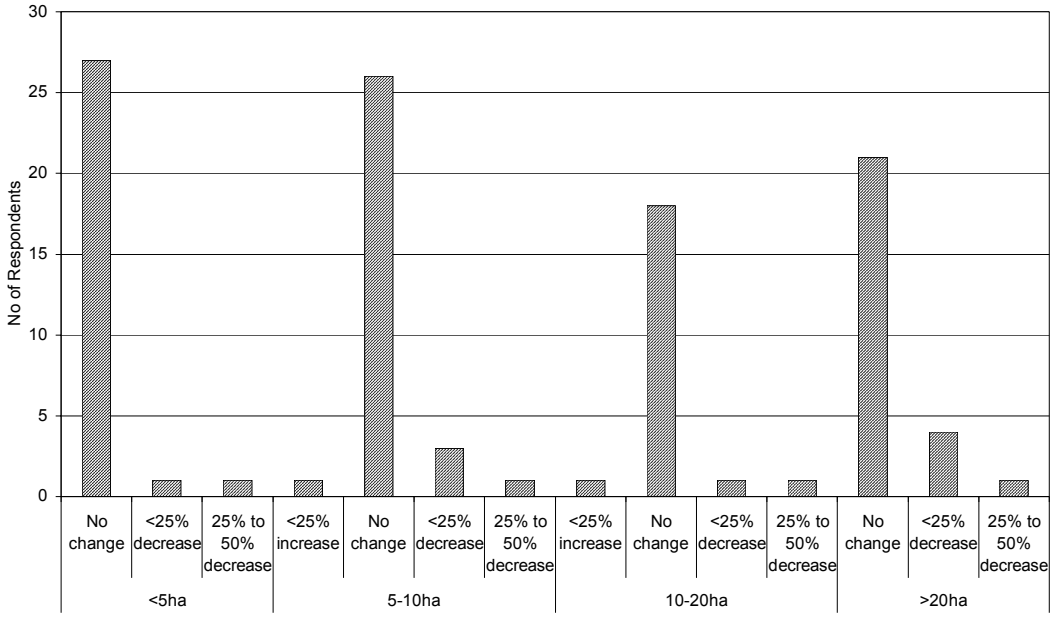

Issues Affecting the Use of Irrigation
No of Respondents
100
90
80
70
60
50
40
30
20
10
0
Environmental Constraints
Water Availability
Other

Under the reformed regime, has the fact that the crop has to be maintained at least until the boll opening under normal growing conditions affected the use of inputs?

Area	Farm Size		Number
Makedonia-Thraki	<5ha	No change	24
		<25% decrease	4
	5-10ha	No change	14
		<25% decrease	6
		25% to 50% decrease	1
	10-20ha	No change	19
		<25% decrease	2
	>20ha	No change	11
		<25% decrease	3
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	No change	27
		<25% decrease	1
		25% to 50% decrease	1
	5-10ha	<25% increase	1
		No change	26
		<25% decrease	3
		25% to 50% decrease	1
	10-20ha	<25% increase	1
		No change	18
		<25% decrease	1
		25% to 50% decrease	1
	>20ha	No change	21
		<25% decrease	4
		25% to 50% decrease	1



Change in Inputs under the Reformed Regime - Ipiros-Peloponi/Thessalia/Sterea Ellas



How do you harvest?

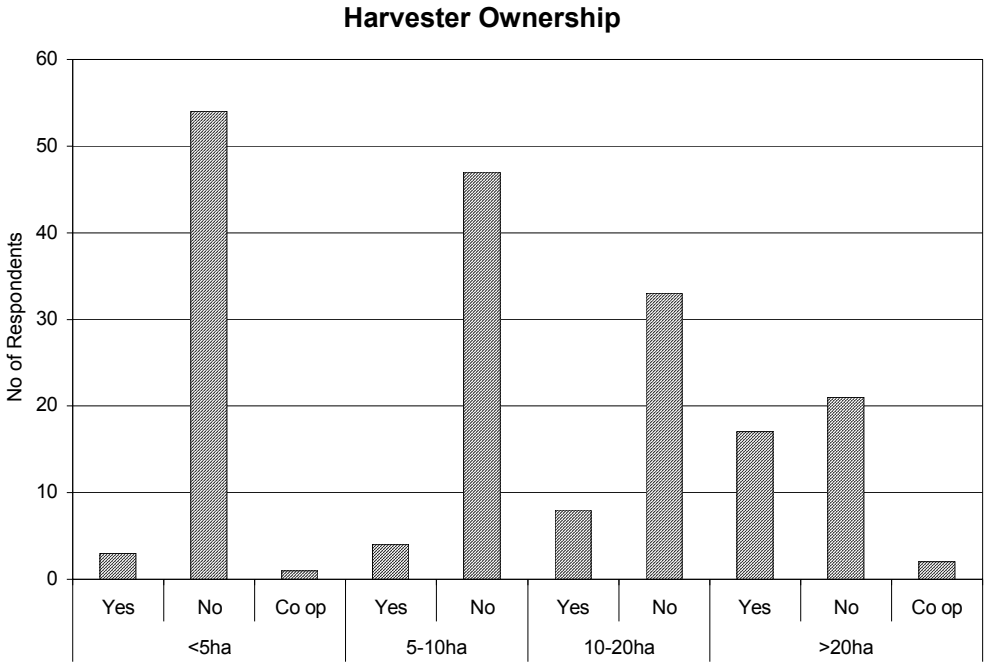
All mechanical harvesting

What is the cost of harvesting per hectare?

Area	Farm Size	€ per ha
Makedonia-Thraki	<5ha	234
	5-10ha	230
	10-20ha	226
	>20ha	205
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	251
	5-10ha	246
	10-20ha	224
	>20ha	226

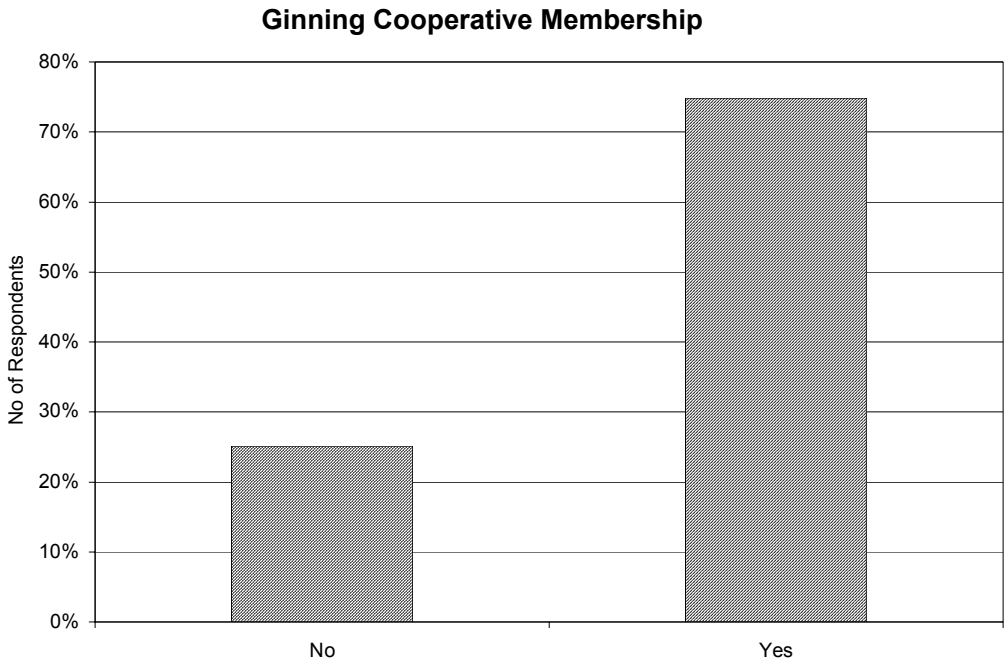
Do you own a harvester?

Area	Farm Size	Own a harvester	Number
Makedonia-Thraki	<5ha	Yes	1
		No	35
	5-10ha	Yes	1
		No	22
	10-20ha	Yes	4
		No	17
	>20ha	Yes	2
		No	12
		Cooperative	1
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Yes	2
		No	19
		Cooperative	1
	5-10ha	Yes	3
		No	25
	10-20ha	Yes	4
		No	16
	>20ha	Yes	15
		No	9
		Cooperative	1



Are you member of a ginning cooperative?

Farm Size	Member	Number	% by size
<5ha	No	18	31%
	Yes	40	69%
5-10ha	No	13	25%
	Yes	38	75%
10-20ha	No	11	27%
	Yes	30	73%
>20ha	No	5	14%
	Yes	32	86%



What percentage of your production do you deliver to this cooperative?

All but 2 producers who were members of a cooperative delivered 100% of production to the coop; the remaining 2 producers delivered 50% of production to the coop.

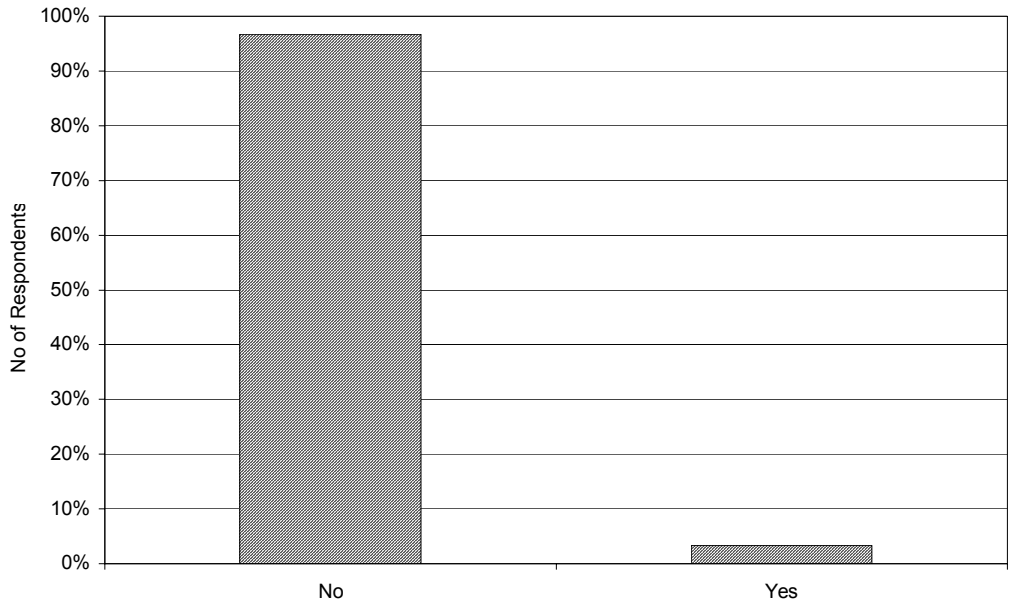
Do you have a contract with a ginner (private or other cooperative)?

All but 1 respondent reported that they had no contract.

Do you receive a premium or incentive from the ginner for improved quality of cotton, such as for staple length, fibre strength, micronaire or colour? If so, how much (per tonne of seed cotton or per bale)?

Farm Size		Number
<5ha	No	56
	No Response	2
5-10ha	No	49
	Yes	2
	No Response	1
10-20ha	No	36
	Yes	1
	No Response	5
>20ha	No	35
	Yes	3
	No Response	2

Premium Received from Ginners



Average Premium where Paid, 2006

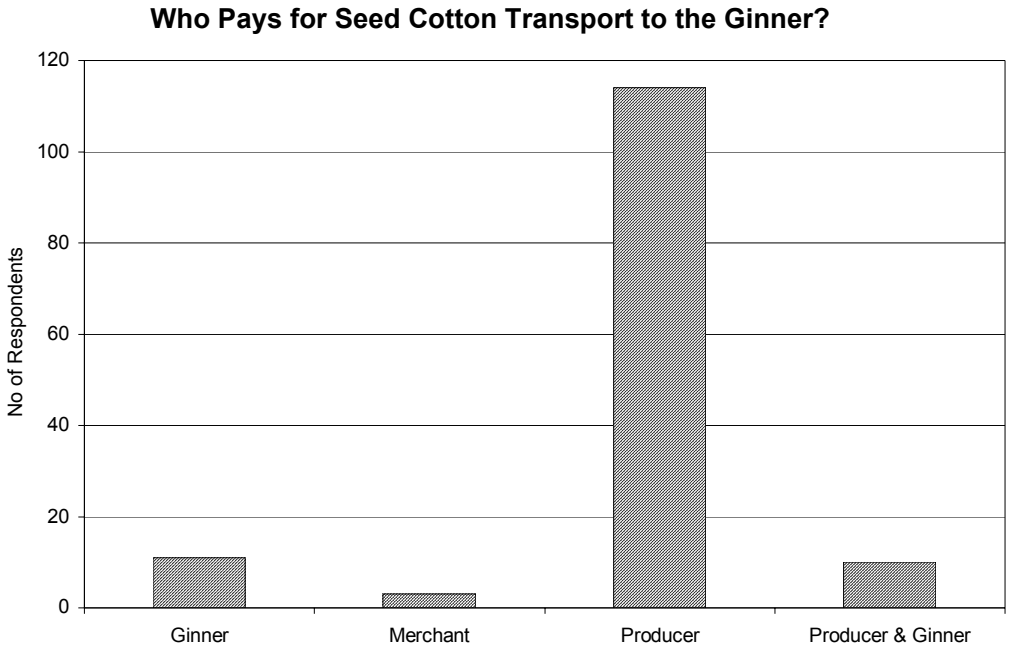
Farm Size	€ per tonne
5-10ha	36
10-20ha	28
>20ha	26

How much does it cost, per km or per tonne of seed cotton or per bale of cotton, to transport your seed cotton to the ginner?

Area	Farm Size	€ per tonne
Makedonia-Thraki	<5ha	12
	5-10ha	12
	10-20ha	13
	>20ha	14
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	25
	5-10ha	25
	10-20ha	25
	>20ha	27

Who pays for this transport?

Area	Farm Size		Number
Makedonia-Thraki	<5ha	Ginner	3
		Producer	21
		(blank)	12
	5-10ha	Ginner	2
		Producer	17
		producer & ginner	2
		(blank)	2
	10-20ha	Ginner	1
		merchant	2
		Producer	12
		(blank)	6
	>20ha	Ginner	2
		merchant	1
		Producer	9
		(blank)	3
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Producer	9
		producer & ginner	4
		(blank)	9
	5-10ha	Ginner	1
		Producer	14
		producer & ginner	2
		(blank)	12
	10-20ha	Producer	14
		producer & ginner	1
		(blank)	6
	>20ha	Ginner	2
		Producer	18
		producer & ginner	1
		(blank)	4



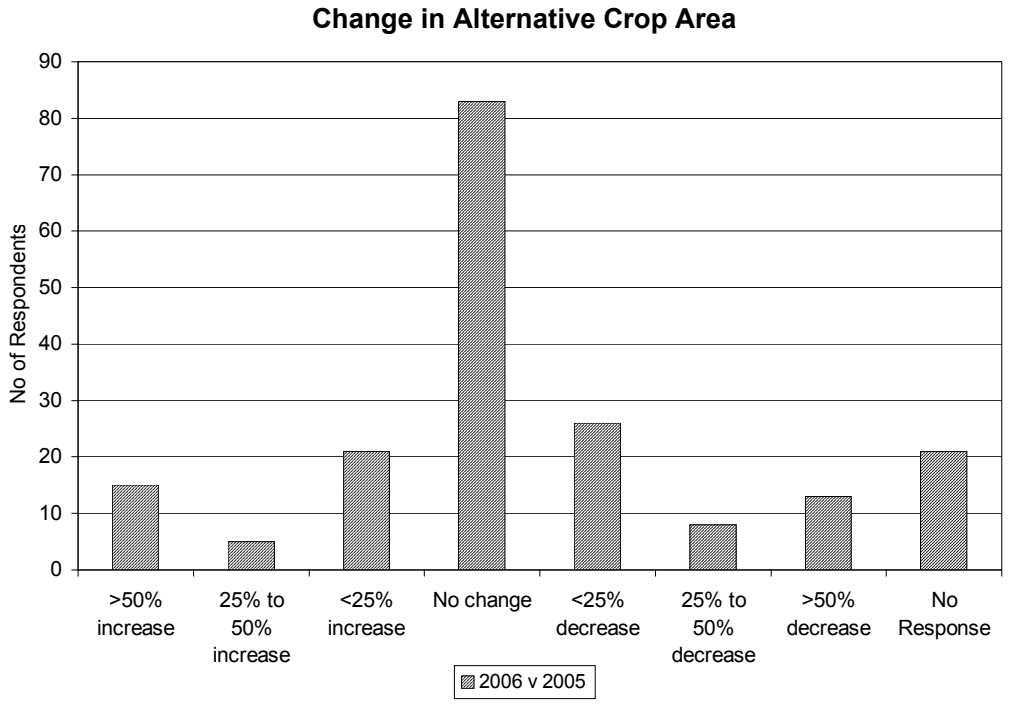
What was the price of unginned cotton in 2005 and 2006 (€ per kg)?

Area	Farm Size	2005	2006
Makedonia-Thraki	<5ha	0.845	0.318
	5-10ha	0.874	0.311
	10-20ha	0.828	0.316
	>20ha	0.798	0.328
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	0.859	0.309
	5-10ha	0.870	0.309
	10-20ha	0.876	0.310
	>20ha	0.851	0.308

QUESTION NUMBER 3: ALTERNATIVE CROPS

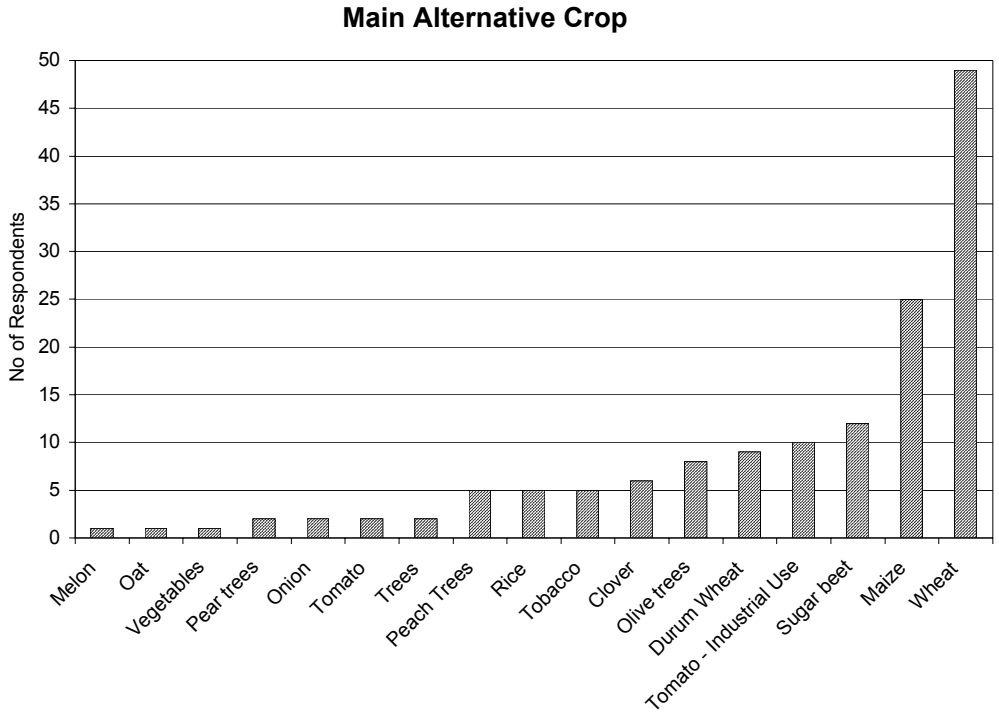
Has your area of non-cotton crops changed since 2000?

Area	Size	Change	2006 v 2005	2005 v 2000
Makedonia-Thraki	<5ha	>50% increase	2	5
		25% to 50% increase	1	
		<25% increase	1	1
		No change	20	21
		<25% decrease	2	2
		25% to 50% decrease	3	
		>50% decrease	2	3
		No Response	5	4
	5-10ha	>50% increase	2	4
		25% to 50% increase	2	
		<25% increase	2	2
		No change	11	8
		<25% decrease	4	5
		25% to 50% decrease	1	2
		No Response	1	2
	10-20ha	>50% increase	3	4
		25% to 50% increase		1
		<25% increase	2	1
		No change	10	9
		<25% decrease	3	2
		25% to 50% decrease		1
		>50% decrease	2	3
		No Response	1	
	>20ha	>50% increase	2	4
		<25% increase	3	2
		No change	6	4
		<25% decrease	1	2
		25% to 50% decrease		2
		>50% decrease	3	1
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	>50% increase		2
		25% to 50% increase		1
		No change	11	10
		<25% decrease	4	2
		25% to 50% decrease	1	1
		>50% decrease	2	2
		No Response	4	4
	5-10ha	>50% increase	2	
		25% to 50% increase	1	3
		<25% increase	2	1
		No change	12	13
		<25% decrease	3	4
		25% to 50% decrease	1	1
		>50% decrease	3	2
		No Response	5	5
	10-20ha	>50% increase	2	1
		25% to 50% increase	1	1
		<25% increase	6	3
		No change	6	5
		<25% decrease	3	3
		25% to 50% decrease	1	1
		>50% decrease		4
		No Response	2	3
	>20ha	>50% increase	2	1
		25% to 50% increase		3
		<25% increase	5	1
		No change	7	6
		<25% decrease	6	2
		25% to 50% decrease	1	2
		>50% decrease	1	2
		No Response	3	8



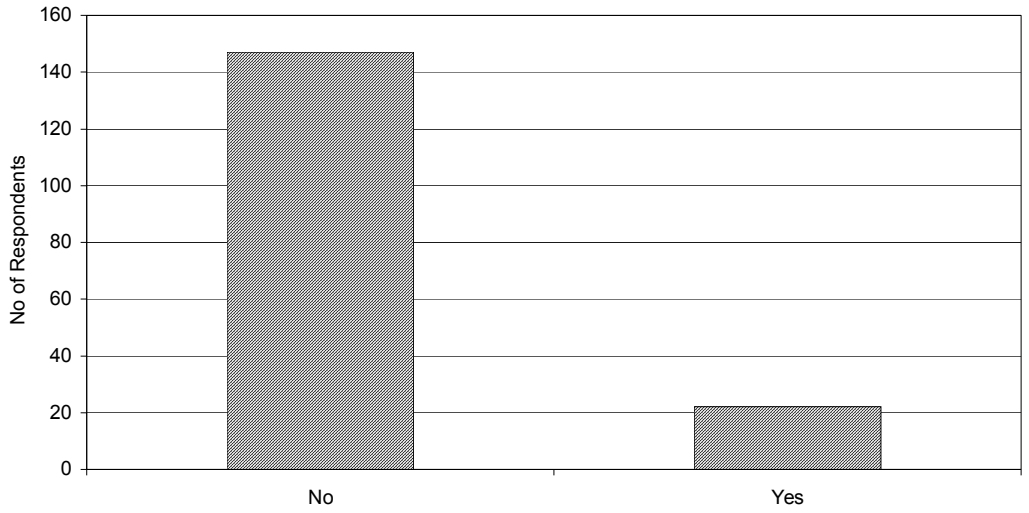
What is your main second crop?

Crop	Number
Melon	1
Oat	1
Vegetables	1
Pear trees	2
Onion	2
Tomato	2
Trees	2
Peach Trees	5
Rice	5
Tobacco	5
Clover	6
Olive trees	8
Durum Wheat	9
Tomato - Industrial Use	10
Sugar beet	12
Maize	25
Wheat	49



Has cotton been replaced by other crops? If so, which ones?

Area		Number
Makedonia-Thraki	No	67
	Yes	11
	No Response	17
Ipiros-Peloponi /Thessalia /Sterea Ellas	No	80
	Yes	11
	No Response	6



How has your use of inputs per hectare for the most important non-cotton crop changed since 2000?

Change in Inputs 2006 v 2005

Area	Farm Size		Seed	Fertiliser	Pesticides	Herbicides	irrigation	Labour
Makedonia-Thraki	<5ha	25% to 50% increase	12%	12%	18%	12%	12%	12%
		<25% increase	0%	18%	0%	0%	0%	0%
		No change	88%	53%	65%	88%	88%	88%
		<25% decrease	0%	18%	18%	0%	0%	0%
		25% to 50% increase	0%	0%	5%	0%	0%	5%
	5-10ha	<25% increase	5%	42%	0%	0%	16%	0%
		<25% decrease	0%	5%	5%	5%	0%	0%
		25% to 50% decrease	0%	5%	0%	0%	0%	0%
	10-20ha	25% to 50% increase	5%	5%	0%	6%	6%	6%
		<25% increase	5%	24%	10%	13%	13%	6%
		No change	67%	48%	62%	75%	81%	88%
		<25% decrease	24%	24%	29%	6%	0%	0%
	>20ha	25% to 50% increase	0%	36%	0%	7%	7%	7%
		<25% increase	93%	43%	86%	0%	7%	93%
		No change	0%	14%	7%	93%	86%	0%
		<25% decrease	7%	7%	7%	0%	0%	0%
		25% to 50% increase	27%	27%	23%	0%	0%	0%
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	<25% increase	41%	36%	32%	33%	29%	21%
		No change	0%	5%	5%	58%	64%	79%
		<25% decrease	0%	0%	0%	8%	7%	0%
		25% to 50% decrease	32%	32%	41%	0%	0%	0%
		25% to 50% increase	41%	45%	38%	0%	0%	5%
	5-10ha	<25% increase	28%	24%	34%	48%	55%	55%
		No change	7%	7%	3%	43%	40%	27%
		<25% decrease	0%	0%	0%	10%	5%	14%
		25% to 50% decrease	24%	24%	24%	0%	0%	0%
	10-20ha	25% to 50% increase	33%	29%	33%	0%	0%	6%
		<25% increase	48%	52%	48%	38%	31%	25%
		No change	19%	19%	19%	63%	69%	69%
	>20ha	25% to 50% increase	4%	4%	8%	0%	0%	0%
		<25% increase	92%	80%	84%	4%	5%	12%
		No change	4%	16%	8%	84%	86%	84%
		<25% decrease	0%	0%	0%	12%	9%	4%

Change in Inputs 2005 v 2000

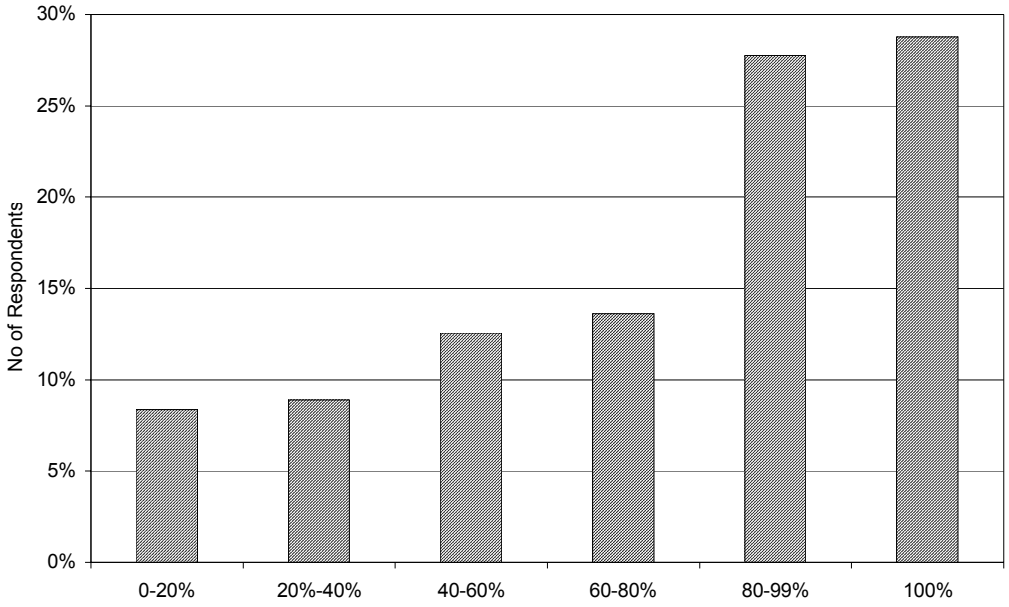
Area	Farm size		Seed	Fertiliser	Pesticides	Herbicides	Irrigation	Labour
Makedonia-Thraki	<5ha	25% to 50% increase	15%	46%	15%	15%	15%	15%
		<25% increase	31%	0%	23%	31%	31%	0%
		No change	54%	38%	46%	54%	46%	85%
		<25% decrease	0%	15%	15%	0%	8%	0%
		25% to 50% increase	5%	44%	35%	0%	6%	5%
	5-10ha	<25% increase	42%	0%	0%	47%	18%	0%
		<25% decrease	5%	11%	6%	0%	0%	16%
		25% to 50% decrease	0%	6%	0%	0%	0%	0%
	10-20ha	25% to 50% increase	5%	24%	0%	7%	7%	7%
		<25% increase	24%	10%	24%	43%	21%	7%
		No change	38%	33%	38%	50%	71%	86%
		<25% decrease	33%	33%	38%	0%	0%	0%
	>20ha	25% to 50% increase	36%	0%	21%	8%	8%	8%
		<25% increase	36%	56%	50%	42%	33%	8%
		No change	7%	11%	7%	50%	58%	75%
		<25% decrease	21%	33%	21%	0%	0%	8%
		25% to 50% increase	25%	25%	18%	33%	33%	27%
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	<25% increase	19%	19%	18%	25%	8%	0%
		No change	13%	6%	12%	25%	50%	73%
		<25% decrease	0%	6%	0%	17%	8%	0%
		25% to 50% decrease	44%	44%	53%	0%	0%	0%
		25% to 50% increase	19%	20%	18%	61%	59%	63%
	5-10ha	<25% increase	25%	7%	18%	17%	6%	0%
		No change	0%	7%	6%	17%	35%	37%
		<25% decrease	0%	7%	0%	6%	0%	0%
		25% to 50% decrease	56%	60%	59%	0%	0%	0%
	10-20ha	25% to 50% increase	47%	47%	47%	31%	31%	31%
		<25% increase	27%	27%	27%	44%	0%	0%
		No change	27%	27%	27%	25%	69%	69%
	>20ha	25% to 50% increase	71%	67%	71%	4%	5%	8%
		<25% increase	21%	13%	21%	64%	0%	12%
		No change	8%	21%	8%	24%	86%	76%
		<25% decrease	0%	0%	0%	8%	9%	4%

QUESTION NUMBER 4: PRODUCERS' INCOME LEVELS

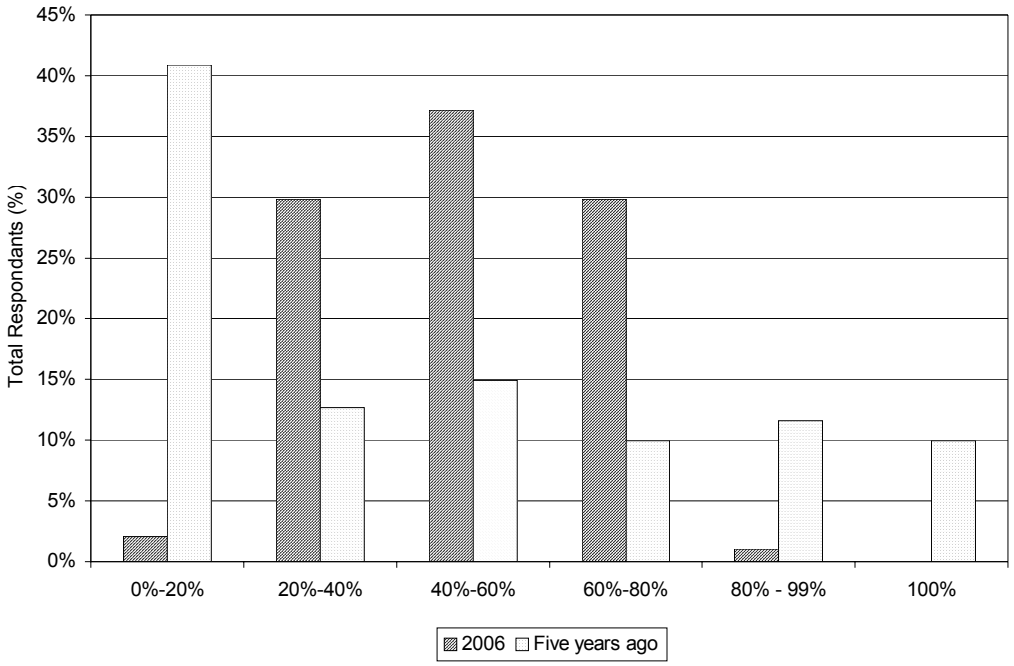
What percentage of farm household income (including decoupled aid) is derived from farm (as opposed to non-farm) activities?

Area	Farm Size		Number
Makedonia-Thraki	<5ha	0%-20%	10
		20%-40%	4
		40%-60%	7
		60%-80%	3
		80% - 99%	4
		100%	8
	5-10ha	0%-20%	3
		20%-40%	2
		40%-60%	5
		60%-80%	3
		80% - 99%	2
		100%	8
	10-20ha	0%-20%	2
		20%-40%	2
		40%-60%	1
		60%-80%	1
		80% - 99%	3
		100%	12
	>20ha	0%-20%	1
		40%-60%	1
		60%-80%	1
		80% - 99%	4
		100%	8
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	20%-40%	5
		40%-60%	6
		60%-80%	2
		80% - 99%	5
		100%	3
		No Response	1
	5-10ha	20%-40%	3
		40%-60%	1
		60%-80%	7
		80% - 99%	14
		100%	4
	10-20ha	20%-40%	1
		40%-60%	3
		60%-80%	7
		80% - 99%	6
		100%	4
	>20ha	60%-80%	2
		80% - 99%	15
		100%	8

Percentage of Farm Income derived from Farm Activities



Percentage of Farm Income derived from Direct Payments

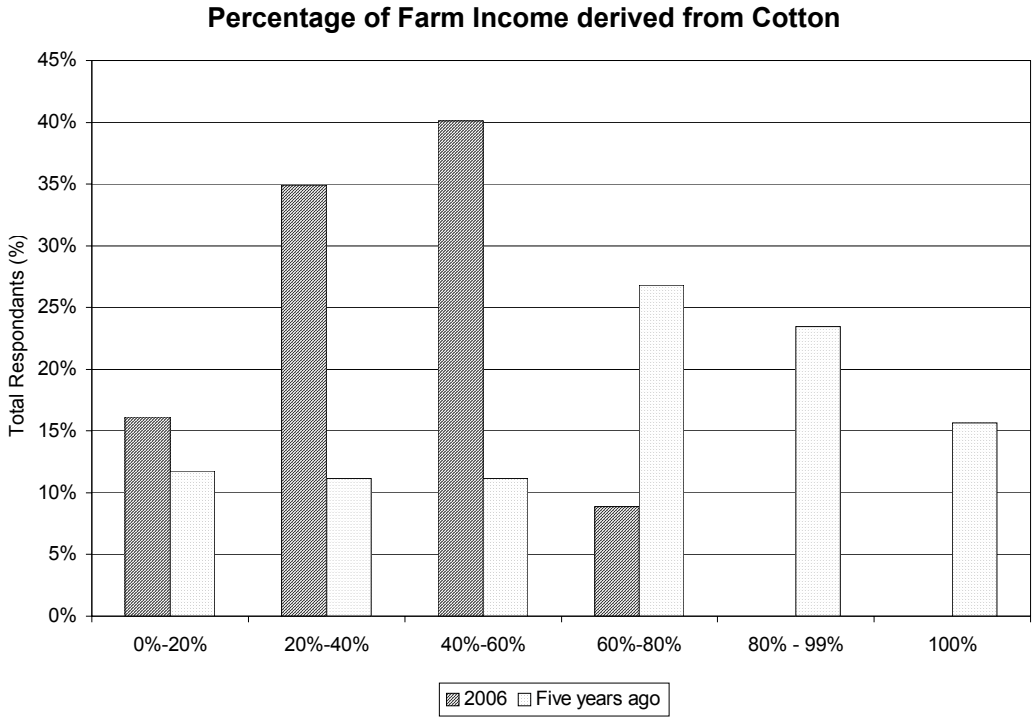


What percentage of farm income is derived from direct payments (from cotton and other crops), which is not tied to the choice of crop (decoupled aid)?

Area	Farm Size		Number 2006	Five years ago
Makedonia-Thraki	<5ha	0%-20%		21
		20%-40%	7	5
		40%-60%	11	3
		60%-80%	18	2
		80% - 99%		1
		No Response		4
	5-10ha	0%-20%	2	11
		20%-40%	2	4
		40%-60%	6	3
		60%-80%	13	1
		80% - 99%		2
		100%		1
		No Response		1
	10-20ha	0%-20%	1	10
		20%-40%	7	5
		40%-60%	7	3
		60%-80%	4	
		80% - 99%	1	
		No Response	1	3
	>20ha	0%-20%		9
		20%-40%	6	4
		40%-60%	5	1
		60%-80%	4	1
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	0%-20%		8
		20%-40%	7	
		40%-60%	10	1
		60%-80%	5	3
		80% - 99%		6
		100%		3
		No Response		1
	5-10ha	0%-20%	1	6
		20%-40%	6	
		40%-60%	15	1
		60%-80%	6	6
		80% - 99%	1	8
		100%		7
		No Response		1
	10-20ha	0%-20%		7
		20%-40%	9	
		40%-60%	8	4
		60%-80%	4	2
		80% - 99%		2
		100%		6
	>20ha	0%-20%		2
		20%-40%	13	5
		40%-60%	9	11
		60%-80%	3	3
		80% - 99%		2
		100%		1
		No Response		1

What percentage of farm income is derived from cotton production, including the cotton area payment (and excluding decoupled aid)?

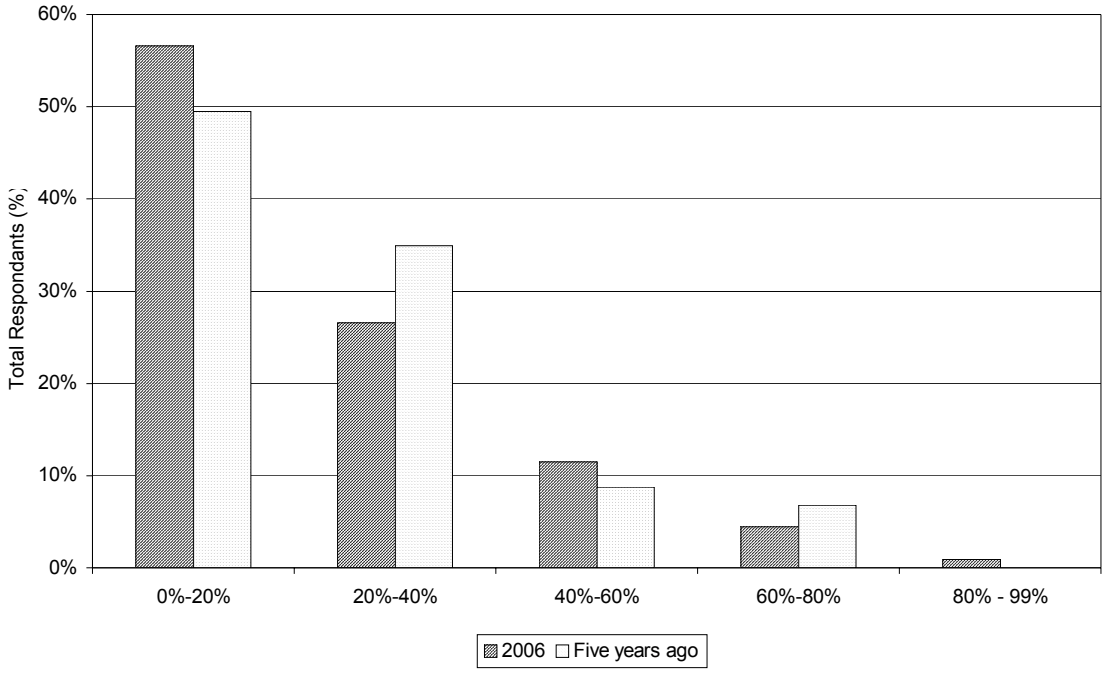
Area	Farm Size		Number 2006	Five years ago
Makedonia-Thraki	<5ha	0%-20%	8	2
		20%-40%	18	5
		40%-60%	8	2
		60%-80%	2	12
		80% - 99%		6
		100%		6
		No Response		3
	5-10ha	0%-20%	6	1
		20%-40%	9	3
		40%-60%	8	4
		60%-80%		9
		80% - 99%		2
		100%		1
		No Response		3
	10-20ha	0%-20%	8	2
		20%-40%	7	6
		40%-60%	5	2
		60%-80%	1	6
		80% - 99%		2
		100%		1
		No Response		2
	>20ha	0%-20%	5	1
		20%-40%	5	1
		40%-60%	4	3
		60%-80%	1	7
		80% - 99%		2
		100%		1
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	0%-20%	1	
		20%-40%	7	
		40%-60%	12	5
		60%-80%	2	2
		80% - 99%		9
		100%		5
		No Response		1
	5-10ha	0%-20%	2	2
		20%-40%	7	2
		40%-60%	12	1
		60%-80%	8	4
		80% - 99%		12
		100%		7
		No Response		1
	10-20ha	0%-20%		4
		20%-40%	8	2
		40%-60%	11	2
		60%-80%	2	2
		80% - 99%		5
		100%		6
	>20ha	0%-20%	1	9
		20%-40%	6	1
		40%-60%	17	1
		60%-80%	1	6
		80% - 99%		4
		100%		1
		No Response		3


Percentage of Farm Income derived from Cotton
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Total Respondants (%)
0%-20%
20%-40%
40%-60%
60%-80%
80% - 99%
100%
2006
Five years ago

What percentage of farm income is derived from other crops? Specify by crop (excluding decoupled aid).

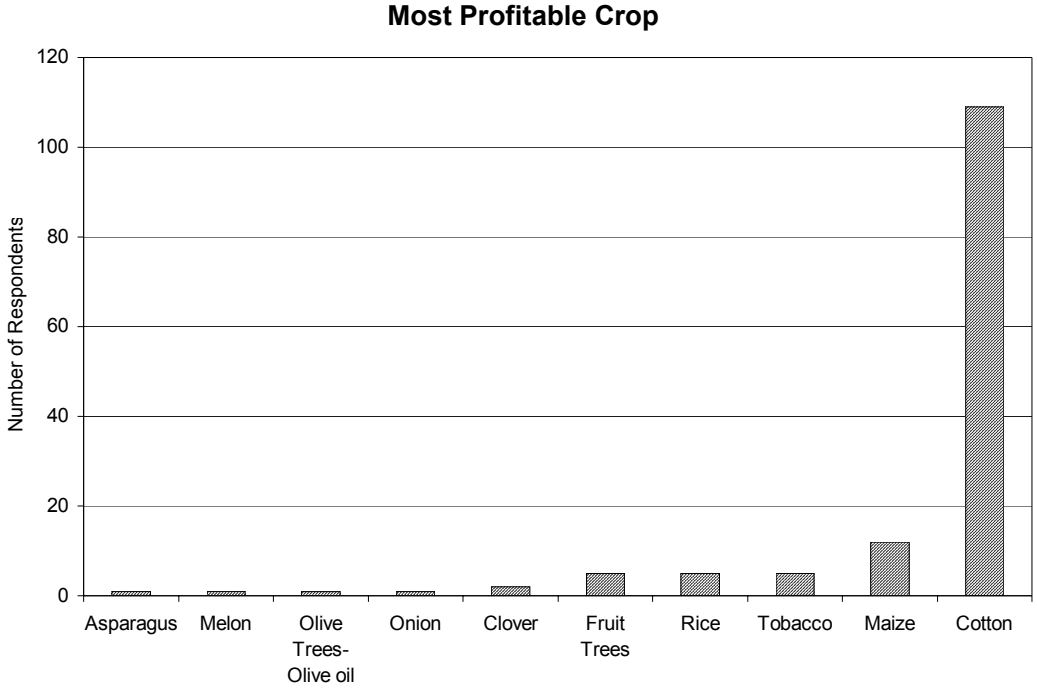
Area	Farm Size		Number 2006	Five years ago
Makedonia-Thraki	<5ha	0%-20%	12	8
		20%-40%	3	2
		60%-80%	1	2
		No Response	20	24
	5-10ha	0%-20%	11	11
		20%-40%	5	5
		60%-80%	2	1
		No Response	5	6
	10-20ha	0%-20%	8	9
		20%-40%	5	4
		40%-60%	3	3
		60%-80%	1	1
		No Response	4	4
	>20ha	0%-20%	5	5
		20%-40%	5	7
		40%-60%	4	1
		No Response	1	2
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	0%-20%	6	5
		20%-40%	3	3
		80% - 99%	1	
		No Response	12	14
	5-10ha	0%-20%	6	5
		20%-40%	3	3
		40%-60%	2	2
		60%-80%		1
		No Response	18	18
	10-20ha	0%-20%	9	3
		20%-40%	1	5
		40%-60%		1
		60%-80%	1	
		No Response	10	12
	>20ha	0%-20%	7	5
		20%-40%	5	7
		40%-60%	4	2
		60%-80%		2
		No Response	9	9

Percentage of Farm Income derived from Other Crops



Which crop is the most profitable?

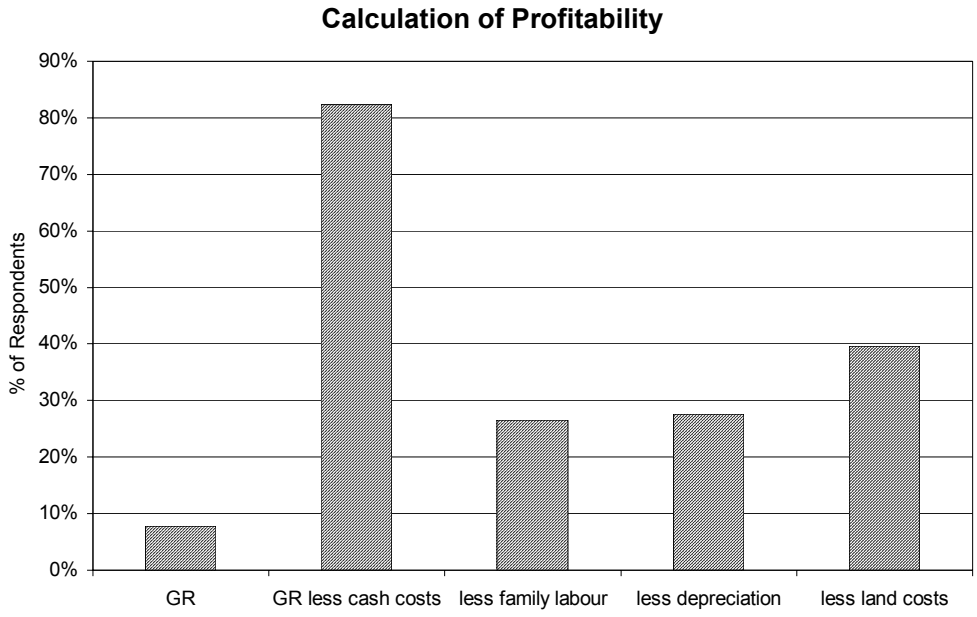
Farm Size	Crop	Number
<5ha	Asparagus	1
	Cotton	35
	Maize	2
	Peach Trees	2
	Rice	1
	Tobacco	1
	Tomato	1
	No Response	13
5-10ha	Clover	1
	Cotton	29
	Maize	5
	Melon	1
	Olive Trees-Olive oil	1
	Tobacco	4
	Tomato	1
	No Response	8
10-20ha	Apple trees	1
	Cotton	25
	Maize	3
	Peach Trees	2
	Rice	1
	Tomato - Industrial Use	1
	No Response	7
>20ha	Clover	1
	Cotton	20
	Maize	2
	Onion	1
	Rice	3
	Tomato - Industrial Use	6
	No Response	6



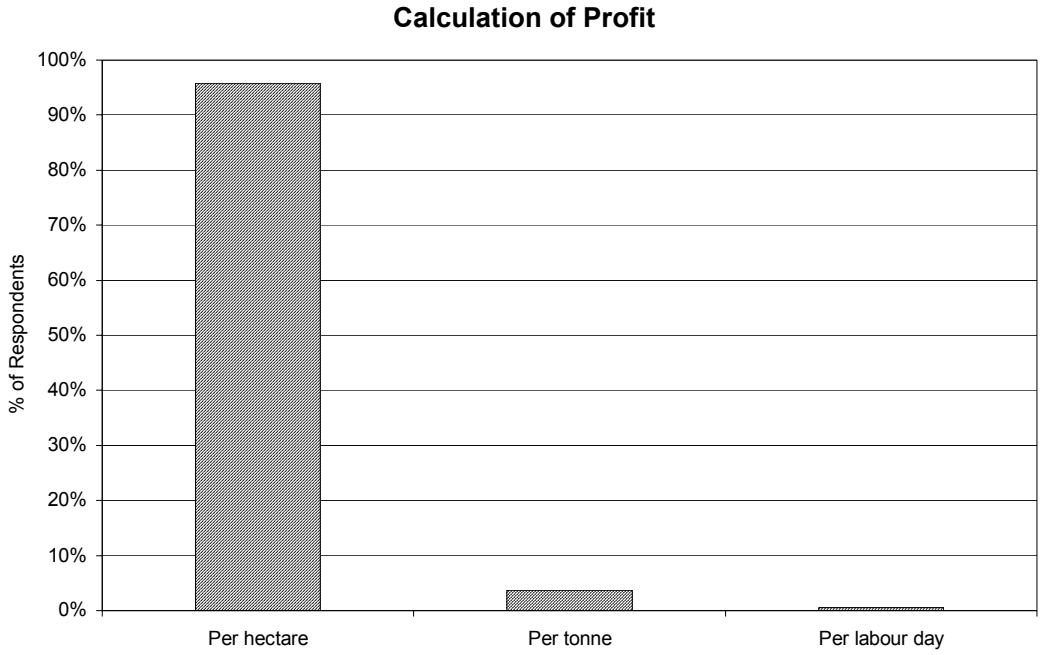
How do you calculate profits?

GR	GR less cash costs	less family labour	less depreciation	less land costs
8%	82%	27%	28%	40%

Note: GR is Gross Revenue

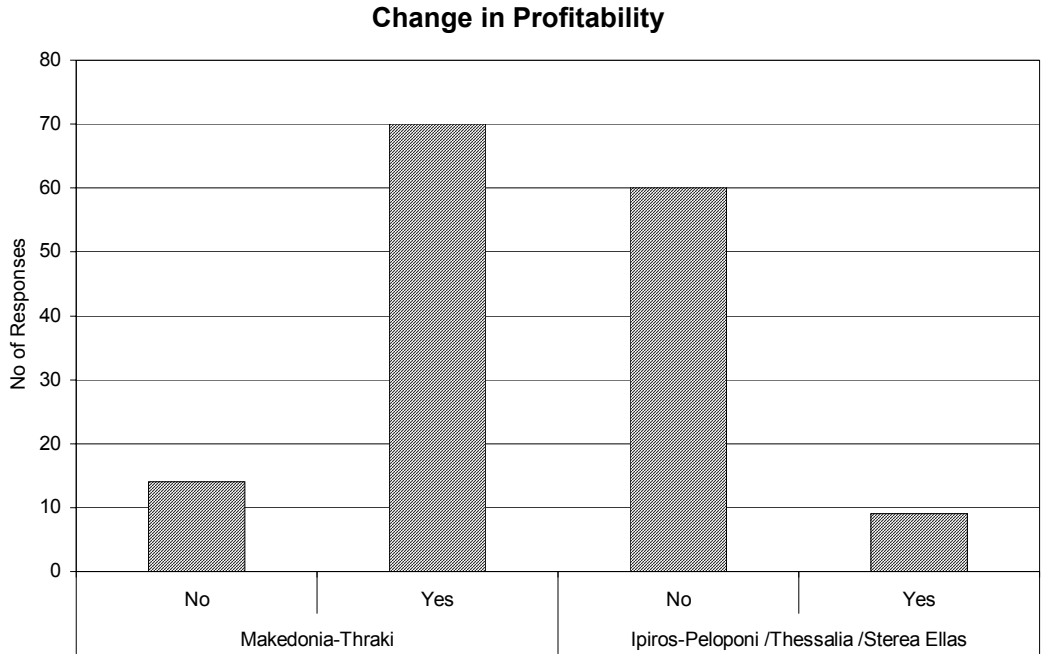


How is profitability judged?



Has the profitability ranking of crops changed over the last five years (including 2006)? If so, which was more profitable five years ago?

Area	Farm Size		Number
Makedonia-Thraki	<5ha	No	4
		Yes	25
		No Response	7
	5-10ha	No	5
		Yes	16
		No Response	2
	10-20ha	No	2
		Yes	17
		No Response	2
	>20ha	No	3
		Yes	12
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	No	15
		Yes	4
		No Response	3
	5-10ha	No	24
		Yes	1
		No Response	4
	10-20ha	No	12
		Yes	3
		No Response	6
	>20ha	No	9
		Yes	1
		No Response	15

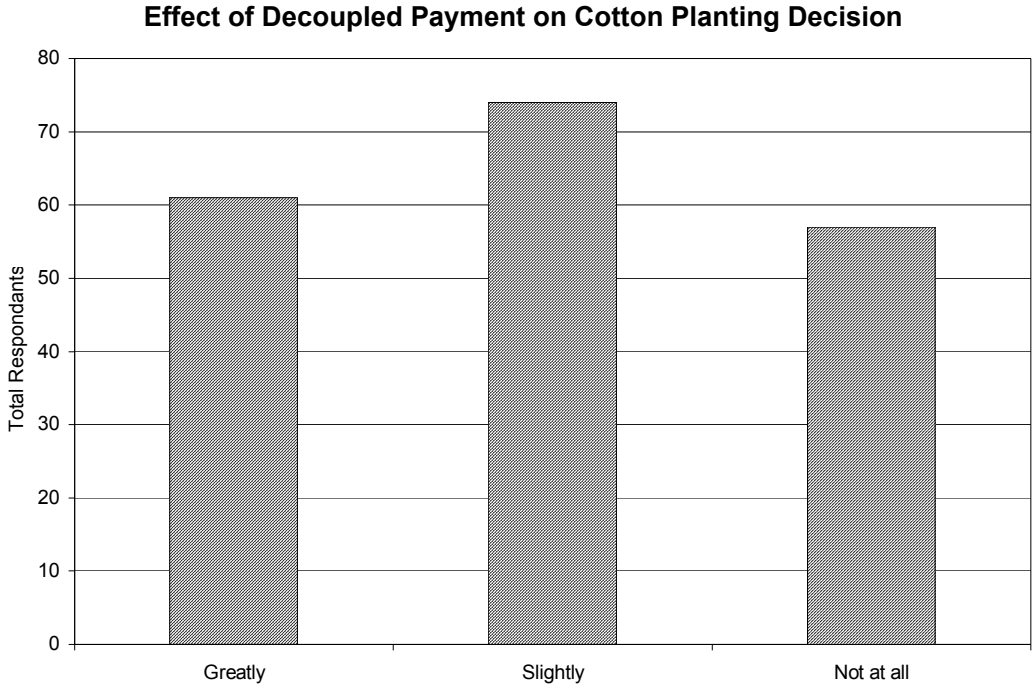


Of respondents reporting a change in ranking, cotton was perceived as being the most profitable crop five years ago in all cases.

QUESTION NUMBER 5: REGIME CHANGE IN 2006

Has the introduction of a payment which is not tied to the choice of crop (decoupled payment) affected how much cotton you plant?

Area	Farm Size		Number
Makedonia-Thraki	<5ha	Greatly	14
		Slightly	12
		Not at all	10
	5-10ha	Greatly	11
		Slightly	8
		Not at all	4
	10-20ha	Greatly	12
		Slightly	7
		Not at all	2
	>20ha	Greatly	10
		Slightly	1
		Not at all	4
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Greatly	4
		Slightly	6
		Not at all	12
	5-10ha	Greatly	6
		Slightly	9
		Not at all	14
	10-20ha	Greatly	2
		Slightly	11
		Not at all	8
	>20ha	Greatly	2
		Slightly	20
		Not at all	3


Effect of Decoupled Payment on Cotton Planting Decision
Total Respondants
80
70
60
50
40
30
20
10
0
Greatly
Slightly
Not at all

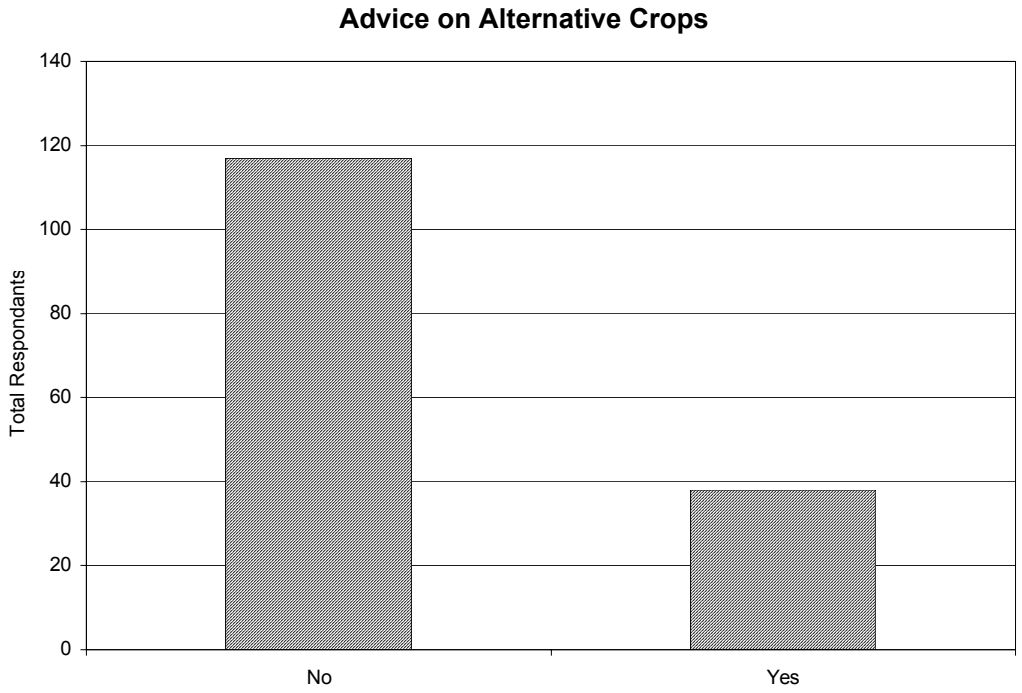
If you choose not to plant cotton, what are the main alternatives you would consider seriously, including land abandonment?

Area	Farm Size	Alternatives	No responses
Makedonia-Thraki	<5ha	Maize	17
		Clover	1
		Edible Peach	1
		Peach	1
		Rice	2
		Set Aside	1
		Tomato	1
		Trees	1
		Wheat	1
		No Response	10
	5-10ha	Clover	2
		Maize	10
		Tomato	1
		Wheat	3
		No Response	7
	10-20ha	Afforestation	1
		land abandonment	1
		Maize	10
		Rice, Maize	1
		Tomato - Industrial Use	2
		Trees	2
		vegetables	1
		No Response	3
	>20ha	Energy Crops	1
		Green Beans, Sugar beet	1
		Maize	3
		No Response	3
		Peach trees, Sugar beet, Maize	1
		Rice	2
		Tomato - Industrial Use	2
		vegetables	1
		Wheat	1
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Clover	2
		Herb	1
		Maize	4
		Tobacco	1
		Tree Crops	2
		Wheat	1
		No Response	11
	5-10ha	Clover	4
		Maize	11
		Onion	1
		Tobacco	2
		Tomato - Industrial Use	2
		Trees	1
		Wheat	3
		No Response	5
	10-20ha	Clover	1
		Maize	6
		Tomato - Industrial Use	1
		Wheat	4
		No Response	9
	>20ha	Clover	1
		Maize	2
		Tomato - Industrial Use	3
		Trees	1
		Vegetables,Clover	1
		No Response	17

The number of no responses suggests less choice in Ipiros-Peloponi /Thessalia /Sterea Ellas.

Have you sought advice on alternative crops? If so, where?

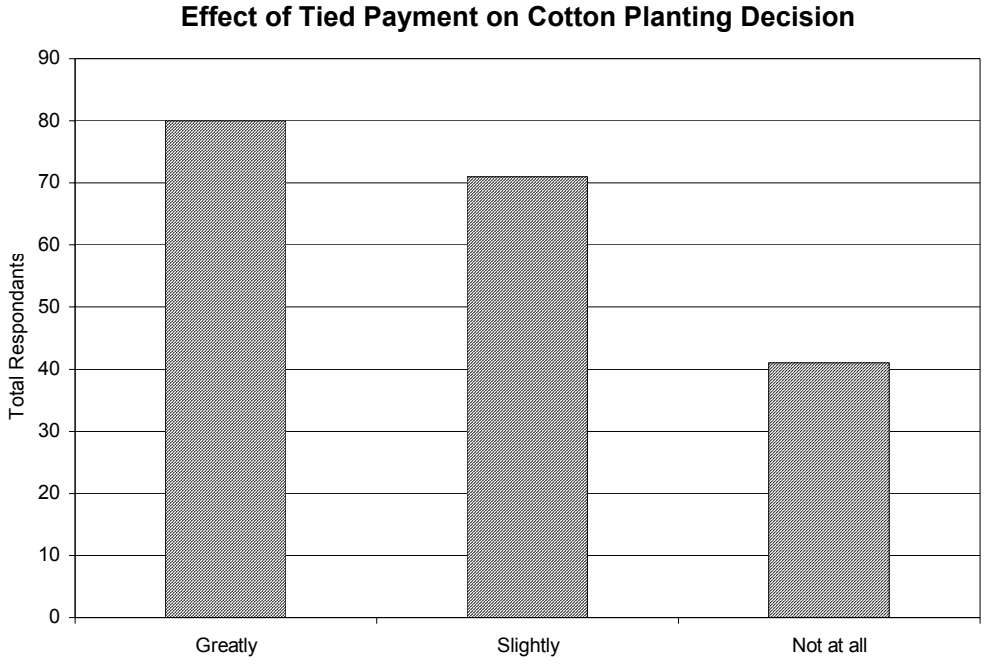
Area	Farm Size		Number
Makedonia-Thraki	<5ha	No	20
		Yes	13
		No Response	3
	5-10ha	No	12
		Yes	11
	10-20ha	No	12
		Yes	9
	>20ha	No	10
		Yes	5
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	No	19
		Yes	1
		No Response	2
	5-10ha	No	22
		No Response	7
	10-20ha	No	16
		No Response	5
	>20ha	No	6
		Yes	8
		No Response	11



Source of Advice	Number
Agricultural Cooperatives	9
Agriculturists	6
Local Authorities	7
Ministry of Agriculture	2
Ministry of Agriculture - Local Authorities	14
Private Consultants	7

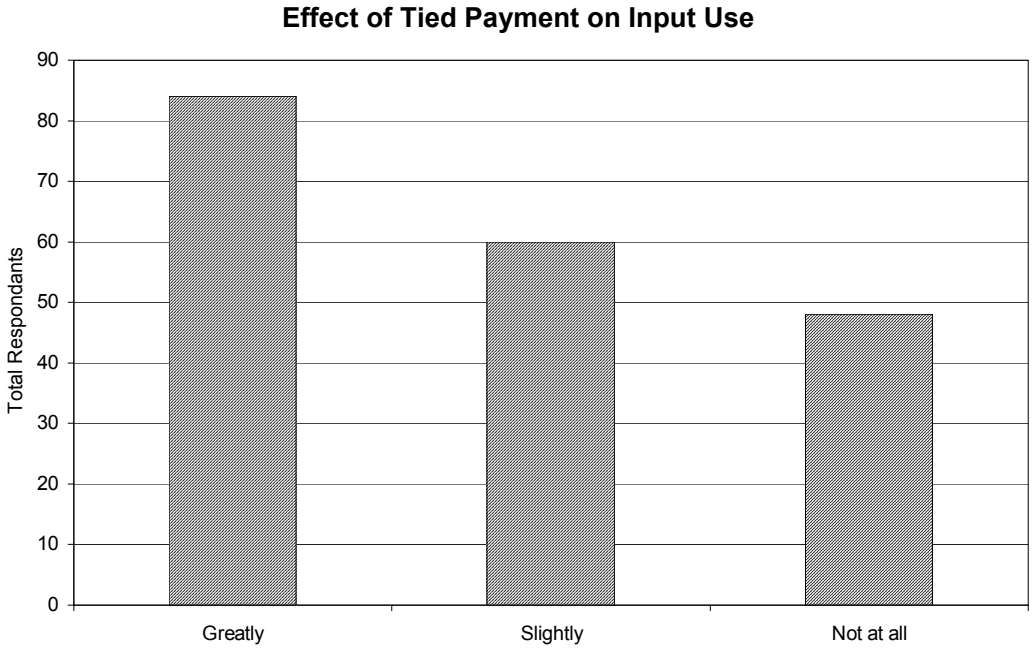
Has the introduction of a payment which is tied to the planting of cotton affected how much cotton you plant?

Area	Farm Size		Number
Makedonia-Thraki	<5ha	Greatly	24
		Slightly	5
		Not at all	7
	5-10ha	Greatly	13
		Slightly	8
		Not at all	2
	10-20ha	Greatly	17
		Slightly	3
		Not at all	1
	>20ha	Greatly	12
		Slightly	2
		Not at all	1
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Greatly	4
		Slightly	10
		Not at all	8
	5-10ha	Greatly	8
		Slightly	9
		Not at all	12
	10-20ha	Greatly	1
		Slightly	13
		Not at all	7
	>20ha	Greatly	1
		Slightly	21
		Not at all	3



Has this payment affected input use?

Area	Farm Size		Number
Makedonia-Thraki	<5ha	Greatly	15
		Slightly	11
		Not at all	10
	5-10ha	Greatly	4
		Slightly	12
		Not at all	7
	10-20ha	Greatly	7
		Slightly	8
		Not at all	6
	>20ha	Greatly	6
		Slightly	5
		Not at all	4
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Greatly	10
		Slightly	6
		Not at all	6
	5-10ha	Greatly	13
		Slightly	7
		Not at all	9
	10-20ha	Greatly	8
		Slightly	8
		Not at all	5
	>20ha	Greatly	21
		Slightly	3
		Not at all	1



What would be the effect on the area you plant with cotton if the level of the payment which is tied to the planting of cotton were changed?

Relationship between Prices and Area

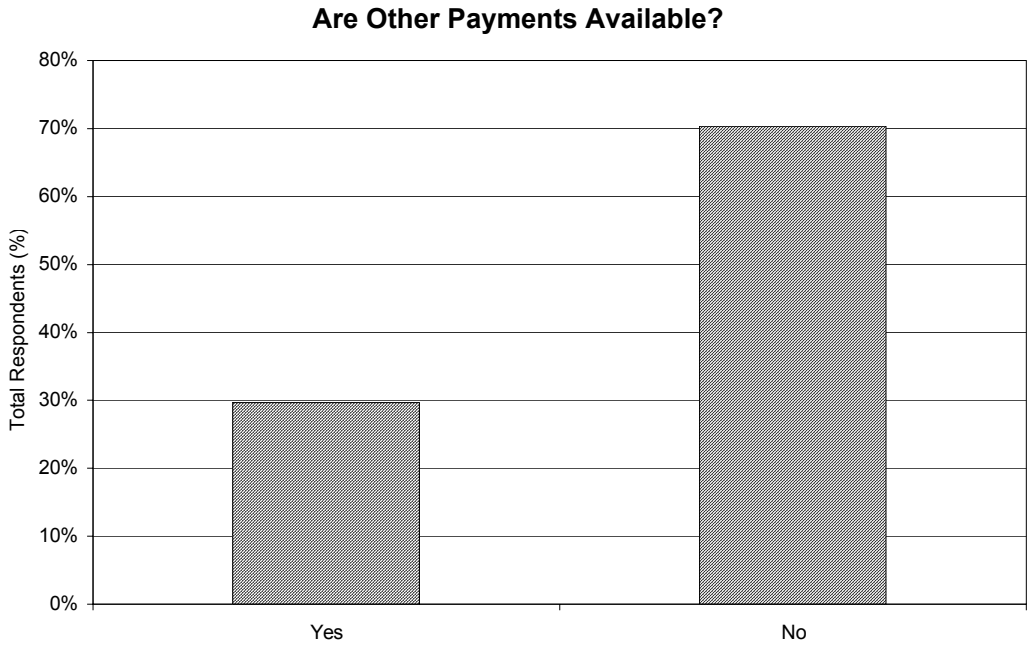
Price/Area	50% rise	30% rise	20% rise	10% rise	10% fall	20% fall	30% fall	50% fall	100% fall
Increase >30%	118	28	1	10	0	0	0	1	1
Increase 30%	8	71	14	6	0	0	1	0	0
Increase 20%	31	34	80	1	0	1	1	1	0
Increase 10%	10	18	21	21	1	0	1	0	0
No change	13	16	55	30	77	49	36	8	10
Decrease 10%	0	1	0	48	72	17	12	4	0
Decrease 20%	1	0	1	55	6	78	49	30	12
Decrease 30%	0	1	0	7	7	5	38	14	13
Decrease > 30%	3	0	0	5	22	27	39	118	134
No Response	33	23	20	9	7	15	15	16	22

Note: Price horizontal, Area Vertical.

Are other payments available to you for growing cotton, i.e, payments for adopting certain environmental norms (agri-environmental programmes, e.g. integrated production)?

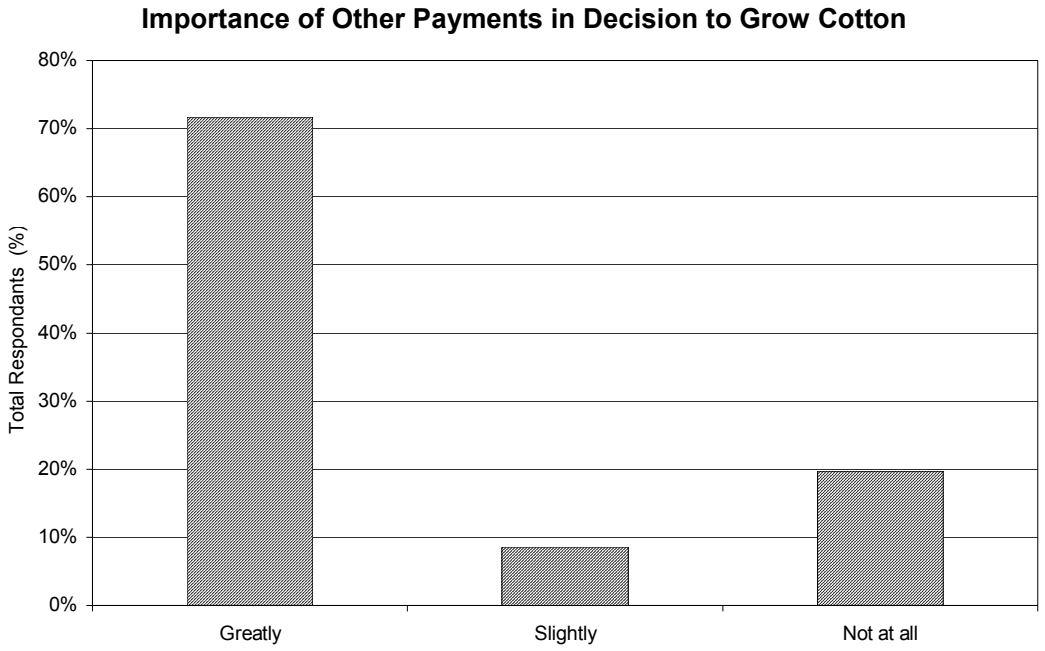
Area	Farm Size	Response	Number
Makedonia-Thraki	<5ha	Yes	1
	5-10ha	Yes	4
	10-20ha	Yes	3
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Yes	9
	5-10ha	Yes	11
	10-20ha	Yes	14
	>20ha	Yes	15

Note: Decline in nitrogen programme only applies to Thessalia/Sterea Ellas region. For Makedonia-Thraki farmers refer to an integrated pest management scheme. However, no payments have been received under this programme.



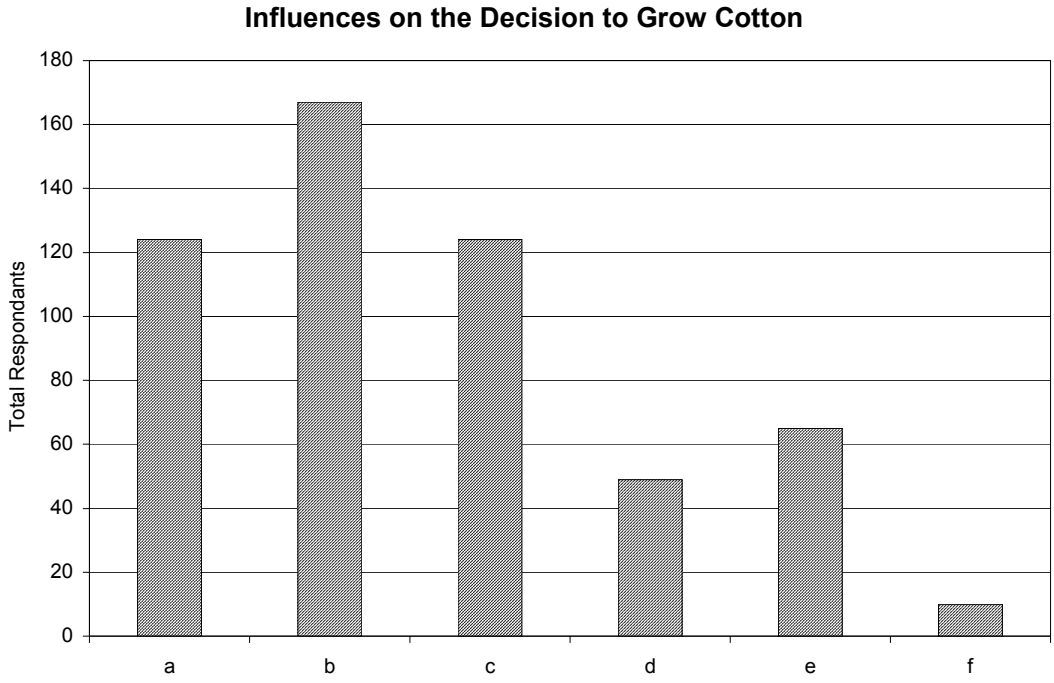
How important are these in your decision to grow cotton?

Area	Farm Size	Response	Number
Makedonia-Thraki	<5ha	Greatly	20
		Slightly	0
		Not at all	7
		No Response	2
	5-10ha	Greatly	15
		Slightly	4
		Not at all	1
		No Response	1
	10-20ha	Greatly	13
		Slightly	3
		Not at all	4
		No Response	1
	>20ha	Greatly	6
		Slightly	1
		Not at all	5
		No Response	2
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	Greatly	8
		Slightly	2
		Not at all	7
		No Response	11
	5-10ha	Greatly	10
		Slightly	2
		Not at all	3
		No Response	16
	10-20ha	Greatly	16
		Not at all	2
		No Response	3
	>20ha	Greatly	21
		Not at all	1
		No Response	4



What influences your decision to grow cotton?

(a = Price paid by the ginner, b = Cotton area payment, c = Direct payment, d = Agri-environmental payment, e = Price of other crops, f = Other)



Area	Farm Size	Influences	Number
Makedonia-Thraki	<5ha	a-b-c	14
		a-b-c-d-e	1
		a-b-c-e	2
		a-b-c-f	1
		a-b-e	2
		a-c	1
		a-c-d-e	1
		a-c-e-f	1
		b	5
		b-c	3
		b-c-e	1
		b-e	1
		c-e	1
		f	1
		(blank)	1
	5-10ha	a-b-c	2
		a-b-c-d-e-f	1
		a-b-c-e	3
		a-b-c-f	1
		a-b-e	2
		a-c	1
		b	2
		b-c	3
		b-c-d	1
		b-c-d-e	1
		b-c-e	4
		b-e	1
		f	1
	10-20ha	a	1
		a-b	1
		a-b-c	3
		a-b-c-d	1
		a-b-c-e	2
		b	5
		b-c	2
		b-c-e	2
		b-c-e-f	1
		b-e	1
		f	2
	>20ha	a	1
		a-b-c	2
		a-b-c-d-e	2
		a-b-c-e	3
		a-b-c-f	1
		a-b-e	1
		b-c	3
		b-c-e	2
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	a-b	1
		a-b-c	6
		a-b-c-e	2
		a-b-d	2
		a-b-d-e	1
		a-c	3
		b-c-d	1
		b-c-e	4
		e	1
		f	1
	5-10ha	a-b	1
		a-b-c	14
		a-b-d	3
		a-c	1
		a-e	1
		b-c	1
		b-c-d	2
		b-c-e	4
		b-e	1
		e	1
	10-20ha	a-b	1
		a-b-c	3
		a-b-c-d-e	3
		a-b-c-e-f	1
		a-b-d	6
		a-b-d-e	2
		b-c-d	1
		b-c-e	3
		b-d	1
	>20ha	a-b-c	2
		a-b-c-d-e	1
		a-b-c-e	1
		a-b-d	16
		a-b-d-e	1
		a-d-e	1
		b-c-d	1
		b-c-e	2

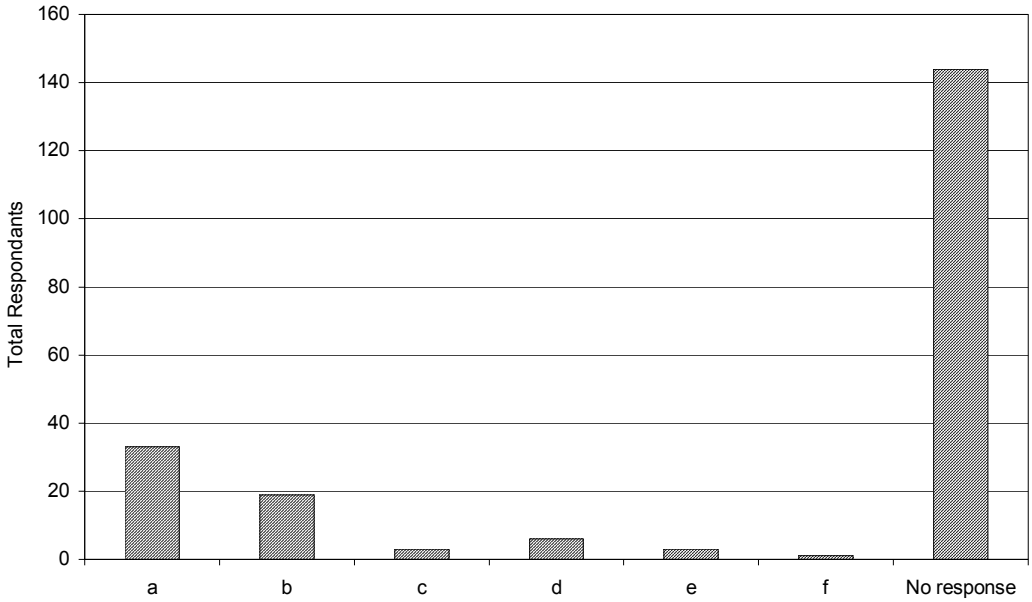
Did you harvest your cotton?

All but 1 producer harvested their crop.

What influences your decision to harvest your cotton crop?

(a = Price paid by the ginner, b = Cotton area payment, c = Direct payment, d = Agri-environmental payment, e = Price of other crops, f = Other)

Influences on the Decision to Harvest Cotton



Area	Farm Size	Influences	Number
Makedonia-Thraki	<5ha	a-b-c-d-e	2
		(blank)	34
	5-10ha	a	1
		(blank)	22
	10-20ha	f	1
		(blank)	20
	>20ha	a-b-c-d-e	1
		(blank)	14
Ipiros-Peloponi /Thessalia /Sterea Ellas	<5ha	a	4
		(blank)	18
	5-10ha	a	3
		a-b	1
		(blank)	25
	10-20ha	a	3
		a-b	3
		a-b-d	1
		(blank)	14
	>20ha	a	3
		a-b	9
		a-b-d	2
		(blank)	11

Appendix 6: Analysis of the US Cotton ginning Sector

In order to provide a benchmark for the European ginning industry, we compare the perfromance of the US industry with that of Europe.

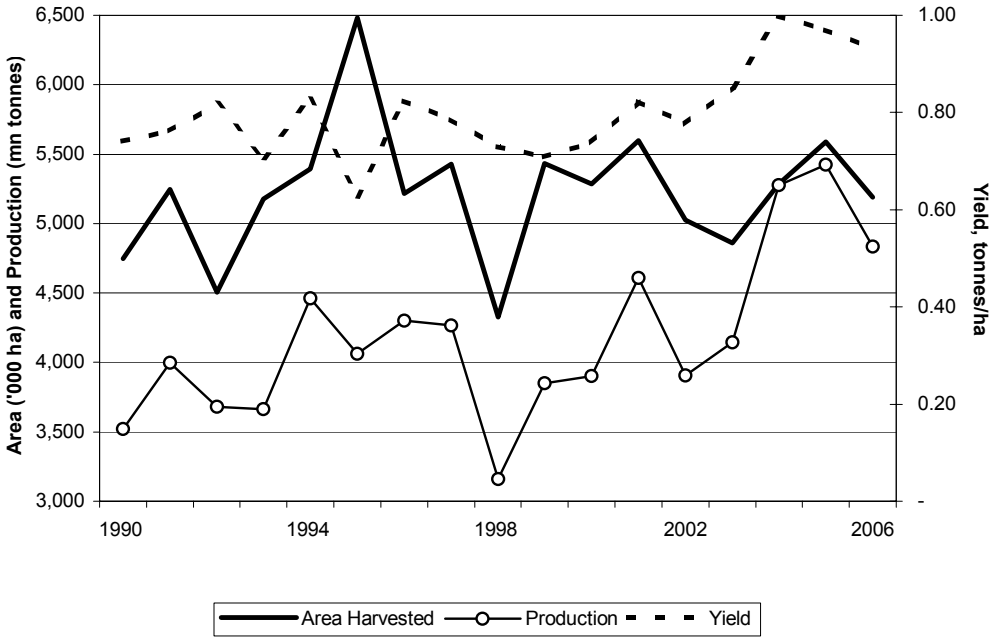
THE SIZE AND SHAPE OF THE US GINNING INDUSTRY

US cotton production, shown in Diagram A6.1, has averaged 4.3 million tonnes per year since 1995. Since 2003, production has moved ahead, averaging 4.9 million tonnes, supported by improvements in yield as well as by exceptionally favourable weather conditions during 2004 and 2005.

The average US yield was stagnant at 0.8 tonnes of lint/ha from 1990 until 2003, but rose to an average of 0.97 tonnes of lint/ha since 2003. Average US yields are low compared to other cotton producing countries because they are pulled down by low yields in the large Southwest region (Diagram A6.2). Yields in the West and Mid-South regions are comparable to yields in Europe, but in the Southwest, with significant area under non-irrigated production and where extreme weather conditions are common, yields are lower. Genetic improvements that have increased the proportion of fibre relative to the seed size (most notably in the FiberMax varieties) are responsible for recent yield increases.

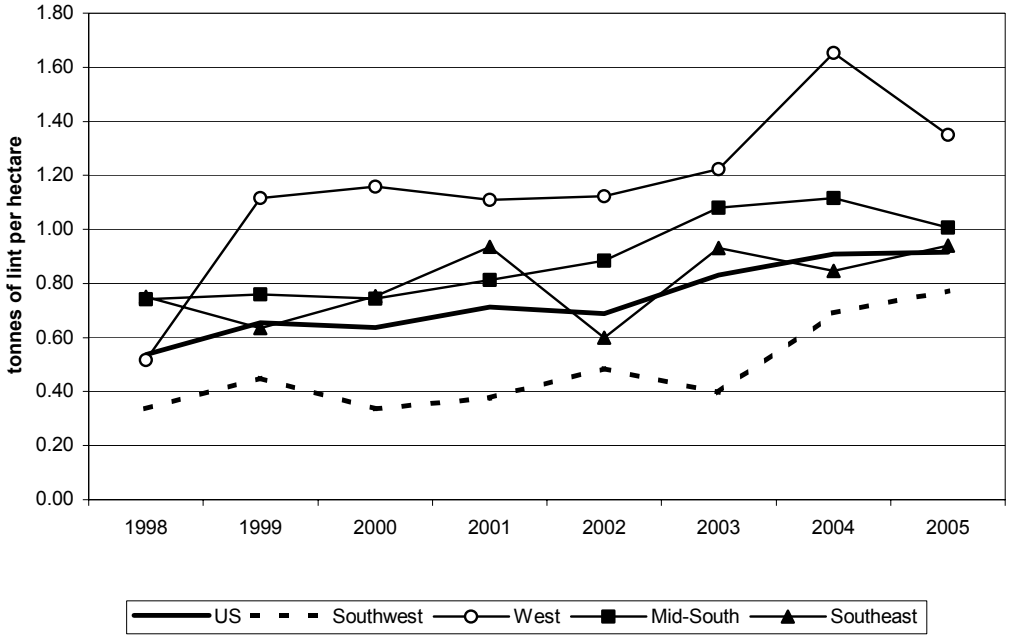
During the period since 1995, the area averaged 5.3 million hectares under cotton, and has shown no overall growth, although the annual fluctuations in area are typical of the sector as it responds to market prices for cotton lint.

Diagram A6.1: US Cotton Area, Yield and Production, 1990-2006



Source: USDA

Diagram A6.2: US Cotton Yields, 1998-2005

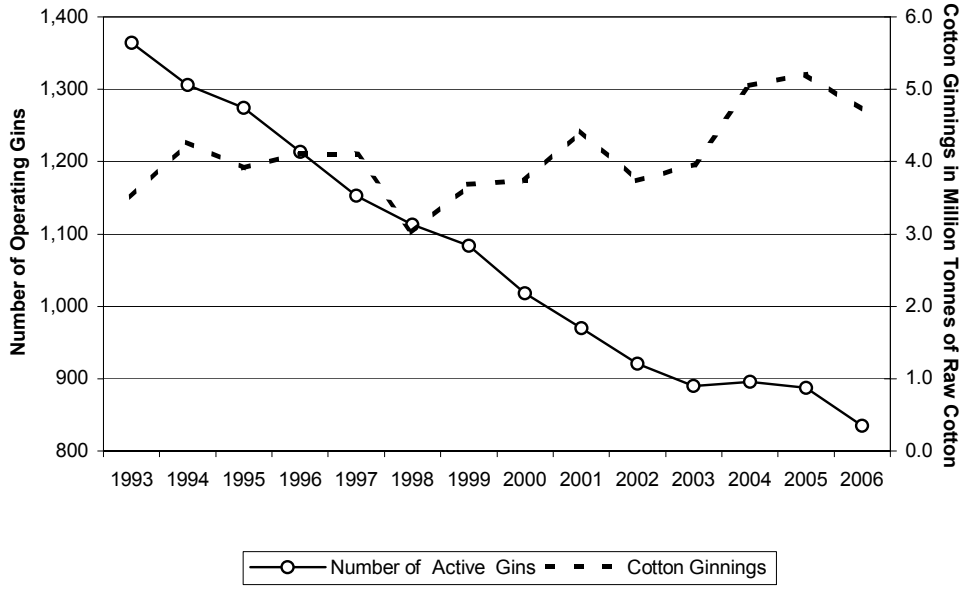


Source: USDA

The number of gins available to process this increasing volume of cotton continues to fall, as Diagram A6.3 demonstrates. In 2006, 837 gins remained in operation, following a steady pattern of closures and consolidations for a number of years.

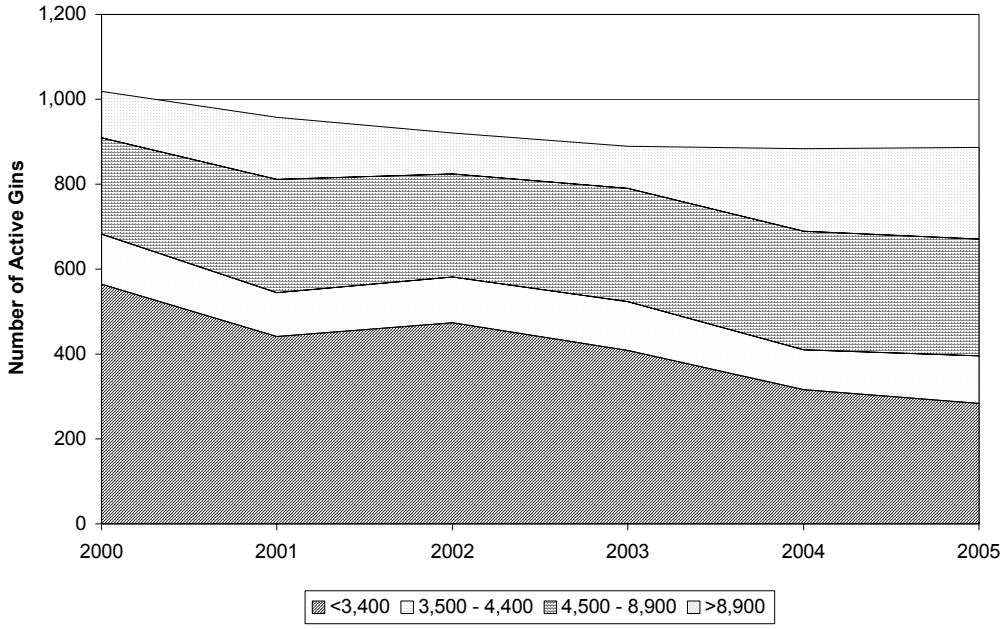
Gins range in size from 3,000 tonnes of lint processing capacity per year, to over 22,000 tonnes per year. The highest number of closures and consolidations is taking place among small gins with less than 3,400 tonnes of annual lint processing capacity, as Diagram A6.4 depicts.

Diagram A6.3: US Cotton Production and Number of Active Gins, 1993-2006



Source: USDA

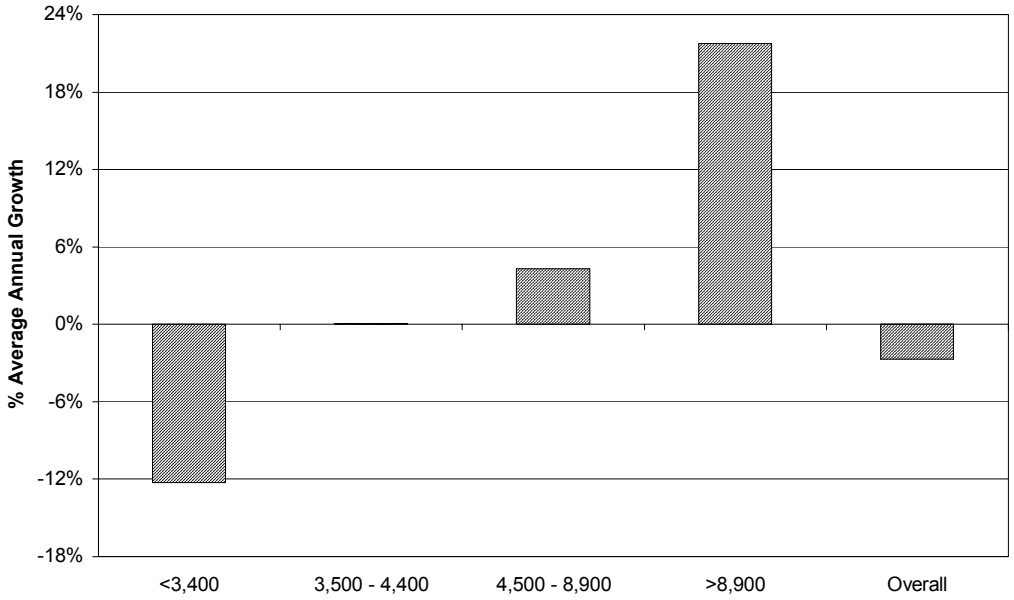
Diagram A6.4: Number of Active Gins and Bales Ginned by Size Group, US, 2000-2005



Source: USDA, LMC estimates

As Diagram A6.5 shows, the number of large gins grew by over 20% between 2000 and 2005, while the number of small gins has declined by about 12% per year. There has been little change in the number of gins processing between 4.400 and 8,900 tonnes of lint per year.

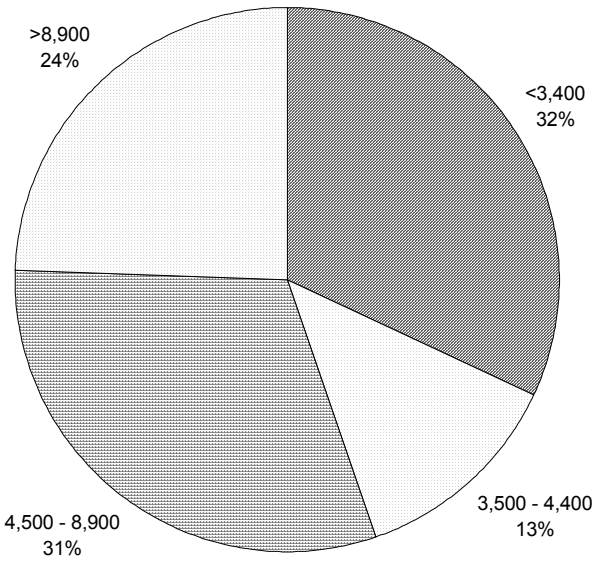
Diagram A6.5: Average Growth in Number of Active Gins by Size, 2000-2005



Source: USDA, LMC estimates

Small gins often consolidate their equipment to form higher capacity gins, usually over 8,900 tonnes of lint per year. New gins that are being built usually have capacities of 15,000 tonnes or more. By 2005, one fourth of US gins had 9,000 tonnes or more of lint processing capacity, as illustrated in Diagram A6.6.

Diagram A6.6: Proportion of US Gins by Size of Processing Capacity, 2005



Source: USDA, LMC estimates

Cotton is produced throughout the southern US, from California in the West to Virginia in the Southeast. The Southwest and the Mid-South regions together account for about 70% of total output (Diagram A6.7), with these two regions alternating in dominance.

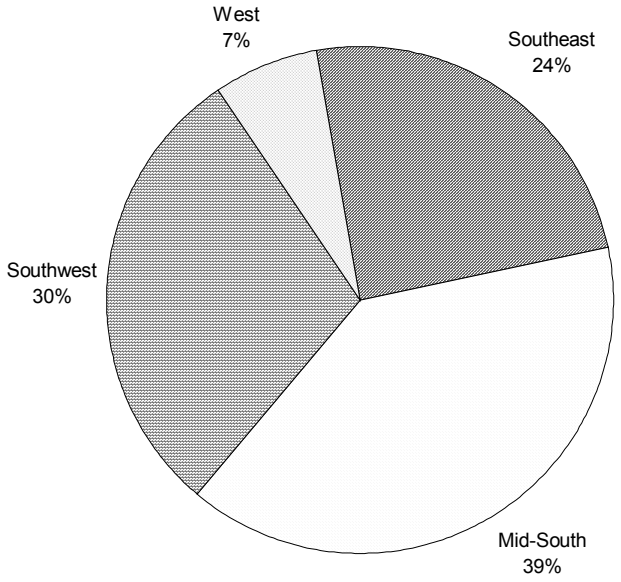
The Southwest's 30% to 40% share of cotton output is significant because it has lower yields and generally lower lint quality. It also has higher ginning costs because of the large number of very small gins and because a particular type of cotton, called stripper cotton, is produced in this region. In the US Southwest, wind storms are common, and to protect the lint from being blown out of the boll, cotton geneticists have developed varieties with a more closed calyx, or bur.

In "picker" cotton varieties, grown in all other regions, the calyx or bur opens fully to completely expose the lint. Picker cotton is harvested by machines with spindles that lift out the fibre without taking in a lot of other plant material (impurities).

Special harvesting equipment is needed for stripper cotton. Stripper cotton is harvested with all the plant material except the main stem, so that at least one third of the harvested product consists of impurities made up of plant material. This makes cleaning in the gin more difficult, and effectively reduces the quality of the lint.

Although costs to the ginner are higher for stripper cotton, they are cheaper for the farmer. Harvesting equipment for stripper cotton costs about $170,000, while a spindle picker costs over $300,000. There is also a difference in operating speed - strippers are much faster, and when farmers are racing against the arrival of fall rains, speed is of the essence. These two factors – lower cost and faster speed – are the reasons why European cotton farmers are increasing their purchases of stripper harvesting equipment, even though it results in lower quality fibre after ginning.

Diagram A6.7: Proportion of US Cotton Production by Region



Source: USDA, LMC estimates

GINNING ACTIVITIES IN THE US COTTON INDUSTRY

The sole function of gins in the US is to process seedcotton. Gins earn income from charges to the farmer for ginning, from sales of the cottonseed and motes (short, poor quality fibres that are cleaned from the processing equipment) and from the "compression fees" that are passed on to ginners from the cotton warehouses.

Almost 98% of US cotton is packed in modules following harvest, and gins incur the costs for transporting the modules from the fields to the factory.

The key distinction between US and European gins is the point at which ownership of the cotton is transferred.

In the US, the farmer pays the ginner for processing, and retains ownership of the lint until it is sold to the cotton merchant or the cooperative of which the farmer may be a member. The farmer is also responsible for paying for storage of the bales of cotton until it is sold.

In Europe, the farmer sells the seedcotton to the gin, which assumes ownership prior to processing in the gin facility.

The US farmer incurs various other charges associated with storage of the ginned cotton. These are described in Table A6.1, and include delivery charges from gin to warehouse; costs for sampling, weighing, tagging, monthly storage, insurance, etc. An important charge is the Universal Density Compression fee, which is a relict from a number of years ago when bales were formed in the warehouse facility. This charge is no longer for an actual service, because gins now form the bales as part of the ginning process. Nonetheless, this UDC charge is passed on to the gins, and is counted as part of their income.

US GINNING PARAMETERS

Table A6.2 outlines various important parameters of the US ginning industry. US gins typically operate for 80 to 90 days during the cotton harvest season. In the past, gins operated at 24 hours/day in order to accommodate the rapid intake of seedcotton at harvest. Now that almost 98% of all cotton is stored in modules in the cotton fields, gins have reduced the hours of operation to 12-16 hours per day and extended the ginning season. During the very large harvest years of 2004 and 2005, ginning season extended well into March.

Gin capacity in rated in the number of bales per hour, and ranges from 15 bales/hour (3 tonnes/hour) to 80 bales/hour (18 tonnes/hour). When the weather is favourable and the seedcotton is dry, gins are able to operate at full capacity. However, when rainy weather soaks the cotton, and the humidity allows more impurities to remain with the seedcotton, then ginning rates fall back to the low level of 12 to 15 bales/hour. Capacity utilisation is typically 70% to 80%.

Table A6.1: Typical Warehouse Charges to the Farmer for Ginned Cotton

Warehouse Charges	$/tonne
Universal Density Compression	42
Delivery, including removing from storage and loading	23
Receiving -- tagging, weighing, USDA sampling, putting in storage	14
Storage, monthly, including fire insurance	9
Weighing at time of shipment	9
Apply special tags at time of shipment	2
Typical Total	100

Source: Farmers Co-op Compress. Lubbock, TX.

Table A6.2: US Ginning Operation Statistics

Average Ginning Period (Days)	82
Average Ginning Rate (tonnes/hour)	4.8
Average Rated Capacity (tonnes/hour)	6.3
Average Capacity Utilisation	76%
Average Seasonal Workers per 1,000 tonnes	3.8
Average Full Time Workers per 1,000 tonnes	0.9
Average days/week	6.3
Average hours/week	17.5

Source: USDA, LMC estimates.

US GINNING COSTS AND MARGINS

One tonne of seedcotton contains about 10% impurities (sticks, leaves, etc) if it is spindle-harvested and up to 30% impurities if it is stripper harvested. The task of the gin is to remove these impurities while maintaining the fibre quality.

The fibre accounts for only about one-third of the seedcotton weight, but for 82% of the value, as Diagrams A6.8 and A6.9 illustrate. The seed accounts for a greater share of the weight, but only 16% of the value.

Diagram A6.8: Volume Components of One Tonne of Seedcotton

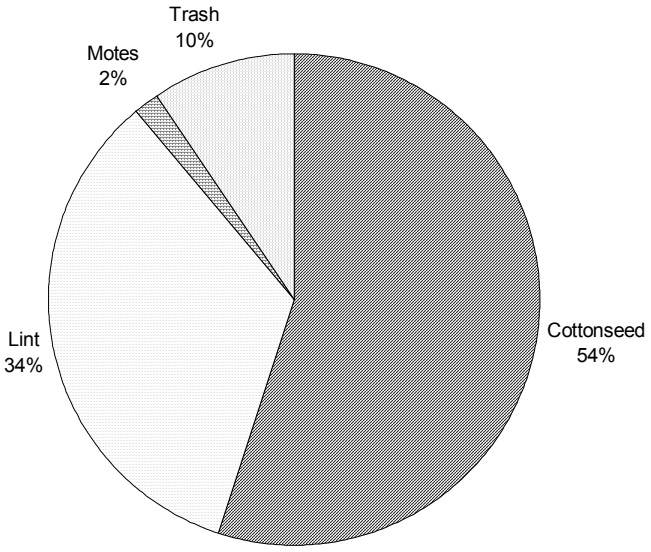
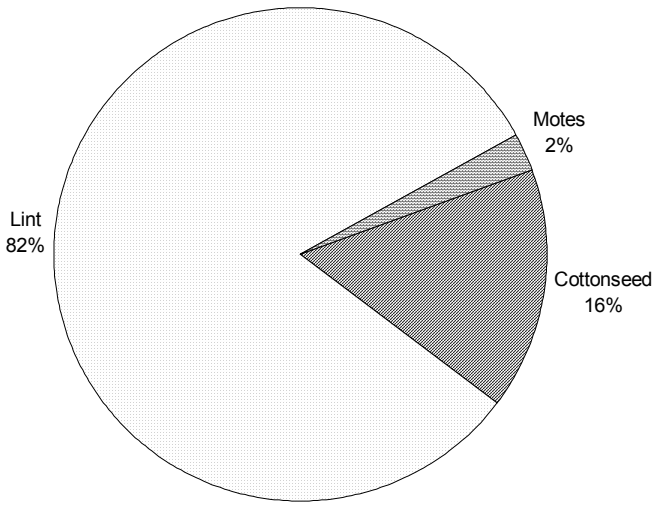


Diagram A6.9: Value Components of One Tonne of Seedcotton



The processing coefficient, or turnout, is the ratio of ginned lint weight to seedcotton weight, and ranges from 28% to 40%. Optimising the turnout rate is important for increasing the revenue for the farmer in the US, and for the ginner in the EU.

Factors influencing turnout rates are diverse, and include the variety of cotton, agronomic practices which ensure the healthy growth of the cotton plant and ginning practices. In the US, farmers are sensitive to the ginning practices of different ginners and avoid gins that do not provide good turnout rates.

Turnout rates for the US are typically between 30% and 33%. Spain has turnout rates averaging 33%, while for Greece they are higher, typically about 35%, but higher in some regions.

Ginning Income

US gins earn income by charging a fee for processing cotton. Typical charges are

- A flat fee per bale (227 kg), often $15 to $20.
- A fee averaging $2/hundredweight (45 kg) of seedcotton.
- A combination of the two.

These charges typically amount to $230/tonne to $255/tonne, and are unrelated to gin size.

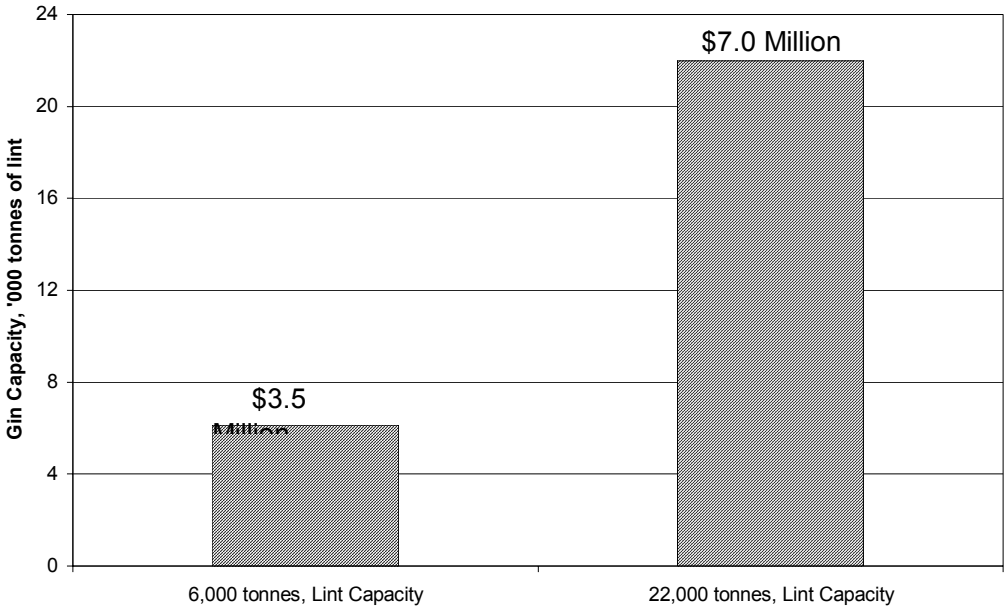
Gins also earn money by purchasing the cottonseed from the farmers at slightly below the market rate and then selling it either directly to dairy farmers or to cottonseed crushers.

Ginning Costs

Economies of scale are important for gins in lowering capital and operating costs.

Investment costs for gins are proportionally higher for small gins than large gins. As Diagram A6.10 points out, the investment costs to install 6,000 tonnes of lint processing capacity are $3.5 million, while for 22,000 tonnes, almost four times the capacity, the investment costs are only double that, at $7 million.

Diagram A6.10: Investment Costs in Ginning Capacity by Scale of Operation



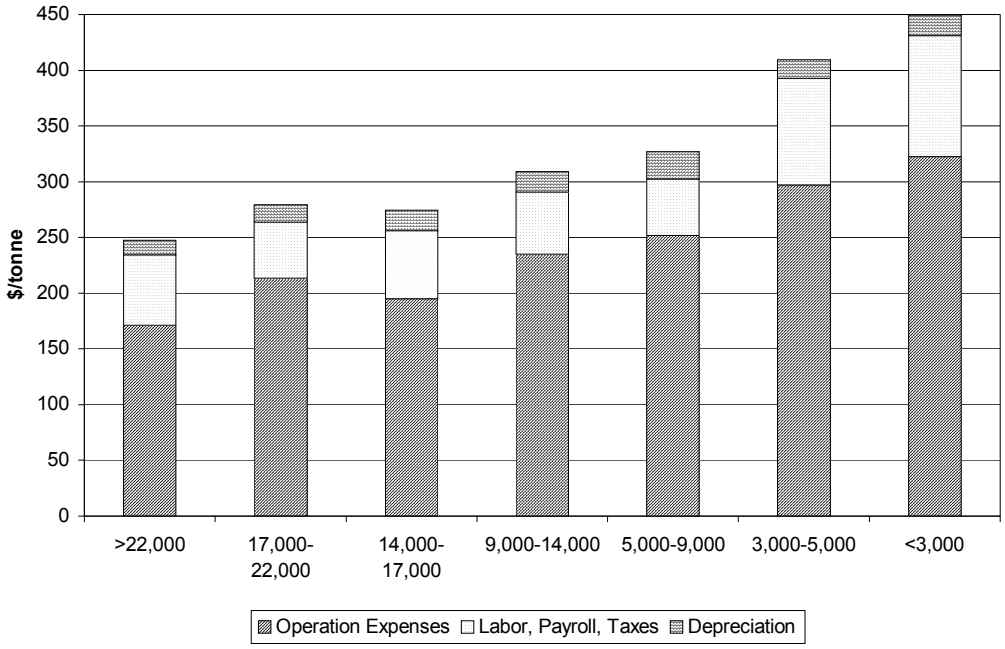
Source: Industry Interviews, LMC estimates

Diagram A6.11 illustrates that ginning costs for large gins are about $225/tonne, which are about half the costs of the smallest gins, which are about $450/tonne. From the same diagram is it evident that costs are similar for gins processing

- 14,000 tonnes or more of lint per year.
- Less than 5,000 tonnes of lint per year.

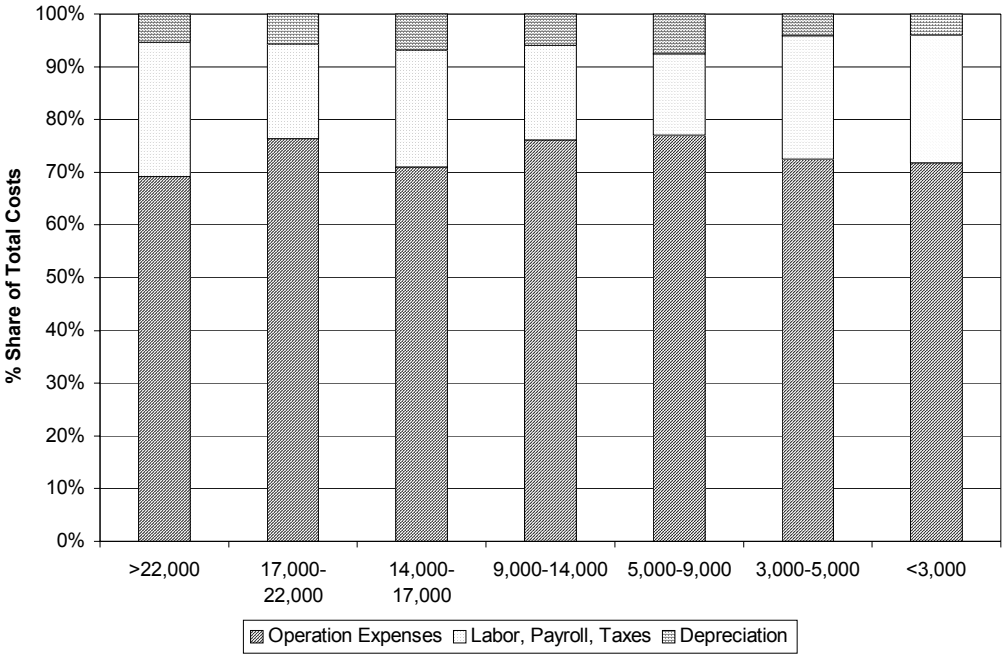
Despite differences in total costs between gin sizes, the proportion of cost components is similar between gin sizes. Diagram A6.12 shows that operating expenses represent about 70% of total costs across all gin sizes.

Diagram A6.11: Operating Costs for Cotton Ginning by Scale of Operation, 2005



Source: Industry Interviews, LMC estimates

Diagram A6.12: Shares of Total Ginning Costs by Category



Source: Industry Interviews, LMC estimates

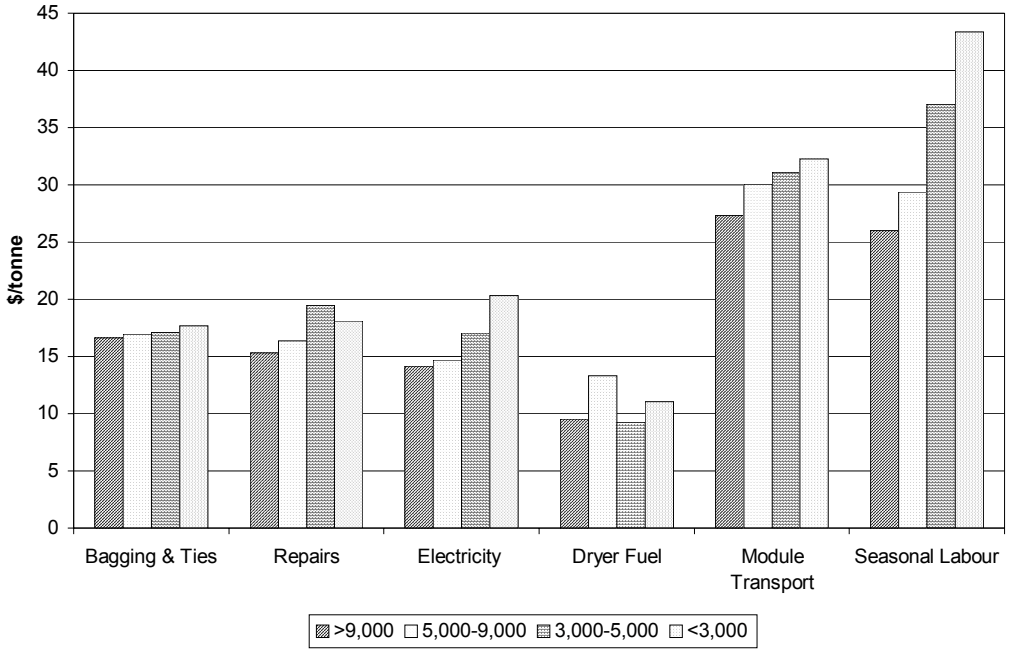
Components of Operating Costs

Diagrams A6.13 and A6.14 present the costs, and shares of costs, of each of the components of operating expenses.

Gin size has a significant effect on energy, transport and seasonal labour costs, with small gins being particularly disadvantaged.

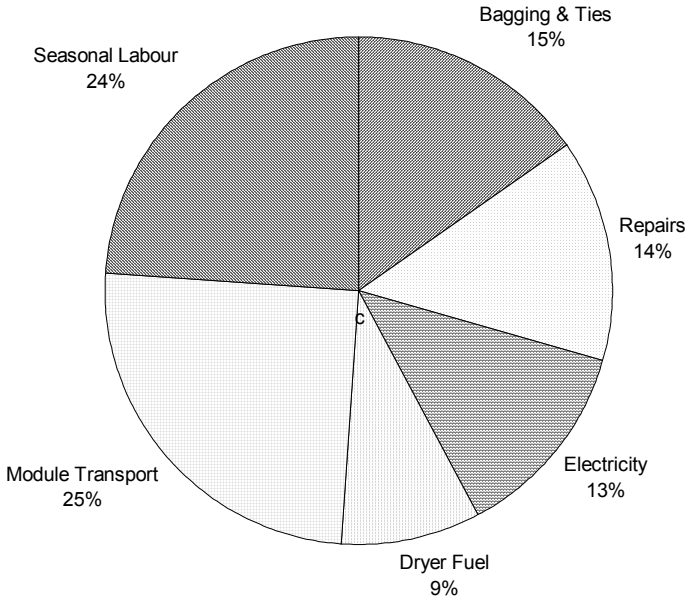
The two dominating elements are the cost of delivering modules to the gin, and the cost of seasonal labour. These two account for about half of the operating costs.

Diagram A6.13: Components of Ginning Operating Costs, 2004



Source: USDA, LMC estimates

Diagram A6.14: Shares of Ginning Costs Components, 2004



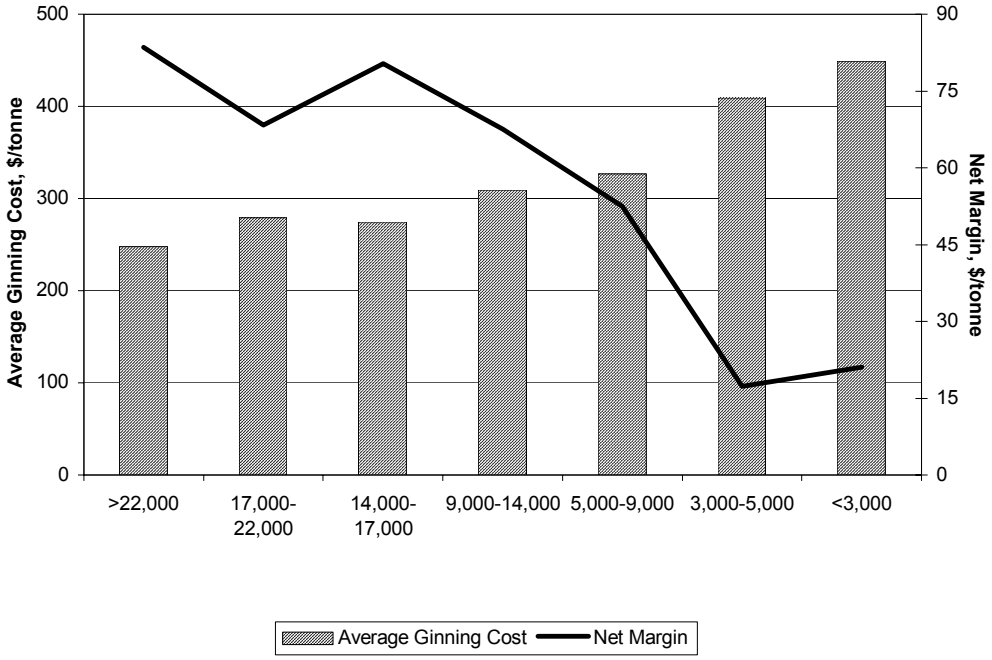
Source: USDA, LMC estimates

Ginning Profit Margins

Diagram A6.15 portrays the inverse relationship between average ginning costs and the net margins, or profits.

Profit margins for large gins, with processing capacity of over 14,000 tonnes of lint, are between $70 and $85/tonne of lint. For gins with less than 5,000 tonnes of lint processing capacity, profit margins are about one-quarter of that, averaging about $20/tonne.

Diagram A6.15: US Average Ginning Costs and Net Margins by Scale of Operation, 2005



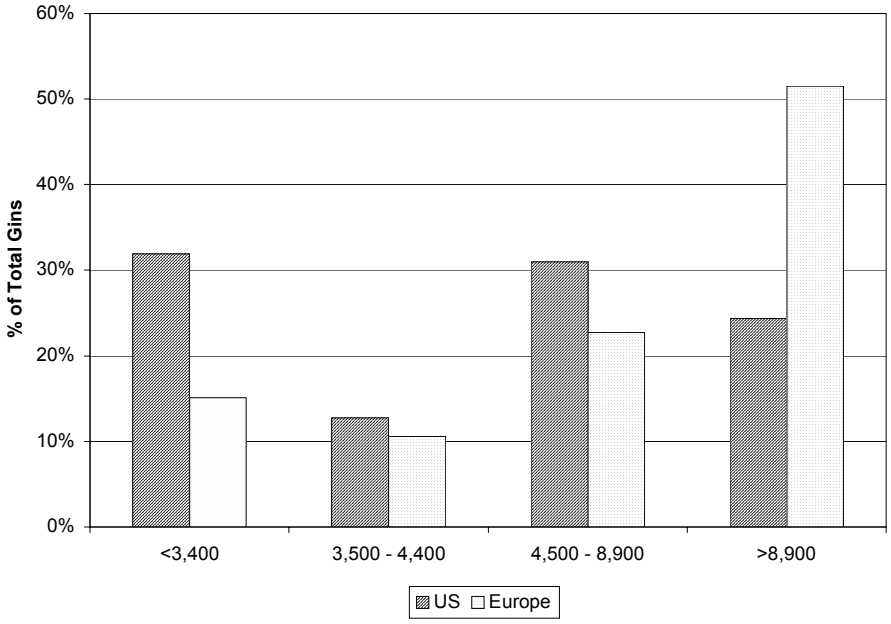
Source: Industry Interviews, LMC estimates

COMPARISON OF THE US AND THE EU COTTON GINNING INDUSTRIES

Gin capacity in the EU is proportionally much higher than in the US (Diagram A6.16). In the EU, about half of the gins have over 9,000 tonnes capacity, with several rated at about 22,000 tonnes.

By contrast, only about 25% of US gins are rated at over 9,000 tonnes of lint, and very few of these have 22,000 tonnes capacity.

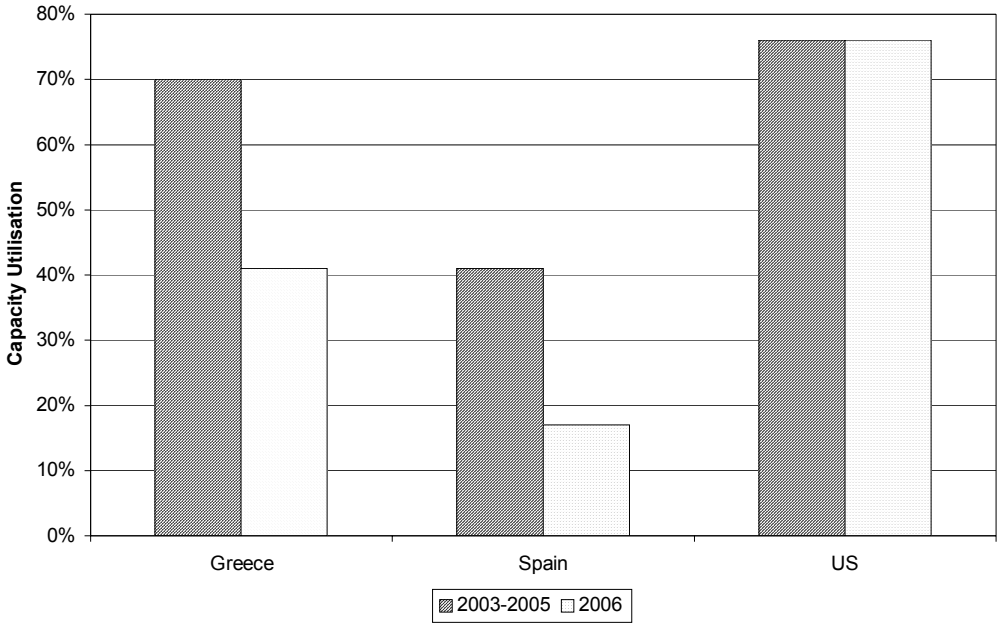
Diagram A6.16: Comparison of US and EU Gin Capacity by Size of Gin



Source: Industry Interviews, USDA, LMC estimates

Utilisation rates in the EU, however, are lower than in the US, as Diagram 17 depicts. In 2005, utilisation rates in Spain and Greece were 41% and 71%, respectively, while for the US, it was estimated to be about 75%. In 2006, the first year of the new regime in the EU, utilisation rates dropped sharply to 17% and about 56% for Spain and Greece, respectively, because not enough cotton was delivered to the gins (Diagram A6.17).

Diagram A6.17: Comparison of Average US and EU Ginning Capacity Utilisation, 2005-2006



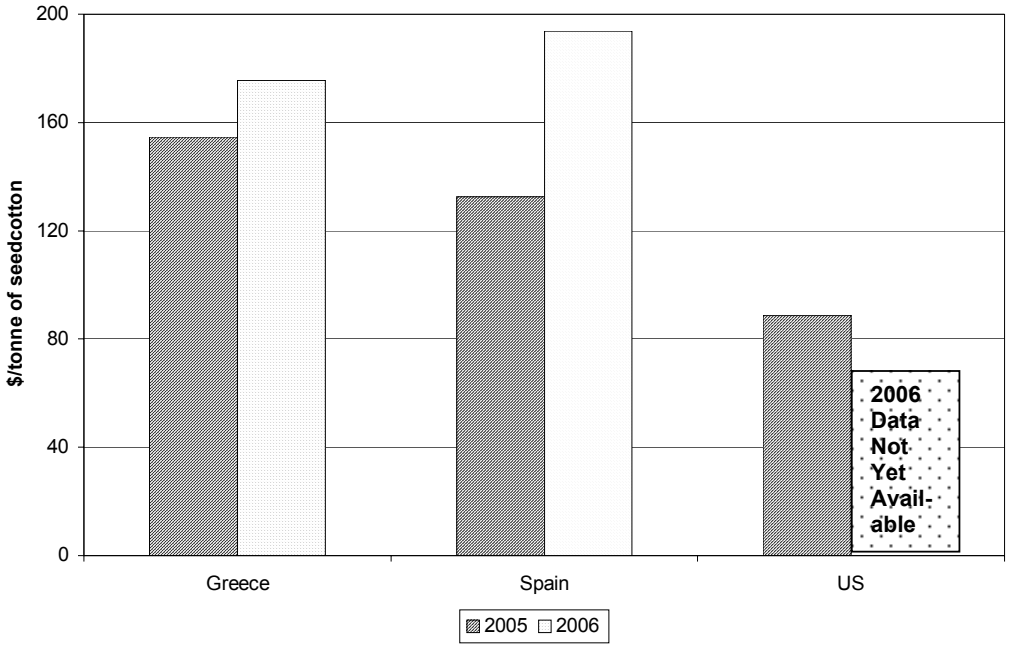
Source: Industry Interviews, USDA, LMC estimates

Diagram A6.18 compares the average processing costs for seedcotton in the US and the EU.

Costs were higher for Greece in 2005, at $155/tonne, followed by Spain at $130/tonne. For the US, using the ginning costs for gin sizes comparable to those in Greece and Spain, the costs were about $90/tonne.

The impact of the new EU regime was greater on Spain than on Greece. Spain's costs per tonne rose 46% to $195/tonne, while Greece's costs rose 14% to $176/tonne. 2006 costs for the US are not yet available.

Diagram A6.18: Comparison of US and EU Average Seedcotton Processing Costs, 2005-2006



Source: Industry Interviews, USDA, LMC estimates

Comparison of Storage and Transport of Seedcotton

Until the 1980s, most seedcotton in the US was delivered by farmers to the gins in "trailers" or buggies. As noted earlier, most US cotton is now compacted by a machine into modules that contain about 9 tonnes of seedcotton. These are stored in the fields at the edge of the fields until the gin is ready to process them. A module carrier is then dispatched to the field to collect the modules. Module carriers may be owned by the gin, or the gin may contract with a company for haulage at about $80/module.

Until the new regime, EU ginners paid for transport. In the new regime, ginners do not always pay for transportation directly. However, they do so indirectly because gins must compete with one another for the limited amount of seedcotton available for processing, since the farmers are not producing to full capabilities. In areas where more than one gin is located, farmers can "shop around" for the highest price not only for the seedcotton but also for the highest transportation incentive.

EU ginners have increased their storage capacity for seedcotton by building large warehouses to protect the seedcotton from the rain. These warehouses allow the gins to process the seedcotton over a slightly longer period of time and thus reduce labour costs.

The higher prices that ginners must offer for seedcotton and transportation offset any savings on labour, however.

SUMMARY

- US gins function only to process seedcotton into bales of lint. The farmer retains ownership of the ginned cotton until it is sold to the cotton merchant or cooperative.
- Gin income is earned from charges for processing the lint, from marketing cottonseed, from sales of motes and from the Universal Density Compression Fee paid to the ginner by the storage warehouses.
- Steady consolidation is taking place in the US cotton industry. Gin size is continually increasing, while smaller gins are closing or pooling their equipment into larger gins. This allows gins to take advantage of economies of scale and to improve capacity utilisation.
- Labour costs and transport costs are the largest cost factors for all sizes of gins, and are the most sensitive to economies of scale.
- Large gins have significantly lower costs and higher profitability than small gins.