Farmers' behaviors regarding the decrease in the area of cotton plantations of Turkey; Izmir case

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Abstract

The main objective of this study is to determine the economical and social reasons of farmers' behaviors concerning the decrease in the area of cotton plantations in Izmir, Turkey. To do so, 84 cotton growers were interviewed in the province of Izmir. According to the results of the study, the cost variable in the cotton farms investigated was calculated as: €1,446.6 ha^{-1}; gross margin, €524.4 ha^{-1}, and the yield, 4,018 kg ha^{-1}. In the studied area, 44% decrease in the area of cotton plantations was observed in 2006 compared to the year 2000. According to the farmers, some of the most important reasons for the decrease in the area of cotton plantations are the decrease (55%) in the producer prices and the increase in the costs (36%) of growing cotton. The possibility of giving up/not giving up cotton production is affected negatively by the social variable of the education level of the farmer, but the cotton growing experience of the farmer, and the farmer's family size, affect the possibility positively. As for the structural /economical variables, farm size negatively affects the possibility but satisfaction from premiums and gross margin have positive effects. Farmers also demand a 90% increase in the premiums and state that they will give up growing cotton unless there are enough subsidies. In this situation, it turns out that to prevent decreases in the area of cotton plantations, it is necessary to lower production costs and provide price stability, along with long term policies consistent with other crops, through which subsidies are determined prior to the season.

Additional key words: cotton, farmers' behaviors, gross margin analysis, logit model.

Resumen

Comportamiento de los agricultores en relación con la disminución de la superficie de las plantaciones de algodón de Turquía; el caso de Izmir

Se estudiaron las razones económicas y sociales del comportamiento de los agricultores que expliquen la disminución de la superficie cultivada de algodón en la provincia de Izmir, Turquía. Para ello, 84 productores de la zona fueron encuestados. Según los resultados del estudio, el coste, el margen bruto y la producción en las fincas de algodón fueron 1.446,6€ ha^{-1}; 524,4€ ha^{-1} y 4.018 kg ha^{-1}, respectivamente. En 2006 el área de las plantaciones estudiadas disminuyó un 44% respecto del año 2000 y, según los agricultores, se explica principalmente por la disminución (55%) de los precios de venta y por el aumento de los costes (36%) del algodón cultivado. La posibilidad de abandonar/no abandonar el cultivo está negativamente afectada por el nivel educativo del agricultor; en cambio, está afectada positivamente por la experiencia en el cultivo del agricultor y el tamaño de la familia de éste. En cuanto a las variables estructurales/económicas, el tamaño de la finca afecta negativamente, pero la posibilidad de obtener primas y el margen bruto tienen efectos positivos. Los agricultores también demandan un aumento del 90% en las primas y aseguran que abandonarán el cultivo a menos que obtengan subsidios suficientes. Dada la situación, para prevenir la disminución del cultivo del algodón es necesario disminuir los costes de produccion y proveer una estabilidad de los precios, junto con políticas a largo plazo consistentes con otros cultivos, a través de las cuales los subsidios queden determinados antes de cada temporada.

Palabras clave adicionales: algodón, análisis del margen bruto, comportamiento de los agricultores, modelo logit.

Introduction

In 2006-2007 season countries with the highest cotton production were China, India and the USA respectively. Turkey with its percentage of 3.19% (of the total production) was in the 7th place. While India, the USA and China occupied the first three places in terms of area of cotton plantations, Turkey took the 9th place. As for cotton consumption, the first four countries are China, India, Pakistan and Turkey respectively. The biggest cotton importing country is China, followed by Turkey in the second place and Pakistan in the third place (USDA, 2008a). In Turkey, approximately 2,441,350 Mg of unginned cotton and 956,540 Mg of cotton fiber are produced in an area of 590,700 ha (TURKSTAT, 2008). About 130,000 farmers live on growing cotton and the sector employs 500.000 permanent and 1,500,000 temporary workers (Ege Union of Exporters, 2004). In Turkey, there are 809 ginning-processing plants, 49 of which are owned by cooperatives and farmer's unions (MARA, 2006a).

In spite of the importance of cotton in Turkey's economy, problems related to cotton haven't been able to be sorted out for years and subsidy policies haven't been able to realize the desired outcomes (Uzmay *et al.,* 2007). In fact, together with fluctuations in the area of cotton plantations in recent years, trends of decreasing plantation area and an increase in cotton imports have been observed. The 756,694 ha area of cotton plantations in 1995 decreased to 590,700 ha, a decrease of 22%, in the year 2006 (TURKSTAT, 2008). The biggest decrease took place in 2005 by 28%. In Turkey, cotton farming is practiced in three particular regions: South-Eastern Anatolia with 309,534 ha; Ege (Western Anatolia) with 146,578 ha and Mediterranean with 129,446 ha. These regions constitute 99% of the total area of Turkey's cotton farms. When the changes in the area of cotton plantations are examined between the years 1995 and 2007, a 23% increase in the South-Eastern Anatolia but decrease of 41% in Ege and 48% in the Mediterranean are noticeable (TURKSTAT, 2008).

There exist several macro-scale studies, dealing with various issues, in the literature: Yilmaz and Yilmaz, 1999; Ege Union of Exporters, 2004; Yilmaz *et al.,* 2005; ICAC, 2006; LMC, 2007; Uzmay *et al.,* 2007; UFT, 2008. In this study, three districts of the province of Izmir, which has the second largest area of cotton plantations within Ege Region, have been taken into the scope of the study. There are studies in Ege Region on costs of cotton and other crops (AERI, 2001; TARIS,

2005) and also on the effects of applicable subsidy policies for cotton production on the farmers' behavior (Isin, 2000; Uzmay, 2003). However, there have been no studies considering the economical and social factors influencing the farmers' reduction of the area of cotton plantations. Therefore, the objectives of this study are i) an assessment of the existing situation; ii) an investigation of economical and social factors that might be have had an effect on their decision to reduce the area of cotton plantations in the recent years; iii) a definition of farmers' expectations.

Material and methods

The primary material of this study consists of data gathered from the producers through questionnaires. The study area was composed of the districts of Bergama, Torbali and Odemis; these districts were selected due to the fact that they are the leading cotton producers, producing 42% (State Agriculture Directorate, Izmir, 2006) of the province's total output (among the 25 districts of the province of Izmir). Villages from these districts such as Asagikiriklar, Yenikent, Yenikoy, Subasi, Kirbas, Ovakent and Seyrekli, which have significantly high cotton production rates were included in the study. There are 647 cotton farms total in these villages. Interviews with farmers were conducted in 2006.

The sample volume was determined through the proportional sampling method (Newbold, 1995). To reach the maximum sample volume, proportion of cotton farmers was taken as 0.50.

$$n = \frac{Np(1-p)}{(N-1)\sigma_{px}^2 + p(1-p)} \quad [1]$$

Where *n*: sample volume, *N*: population, *p*: proportion of cotton farmers (0.50) and σ_{px}^2: variance (0.10 for $\sigma_{px} = 0.05102$).

With this approach, the sample value was calculated as 84 with 95% significance and 10% tolerance making use of the formula [1]. Considering the cotton production percentages of the districts within Izmir, 48 producers from Bergama, 33 from Torbali and 3 from Odemis were picked to constitute the total of 84. When the data was being analyzed, farms were evaluated in three groups depending on their sizes.

Additionally, whether the variables of the plantations are normally distributed was tested (using the Kolmogorov-Smirnov test). To identify whether there is difference between the groups of plantations, one

way ANOVA analysis for parametric variables and Kruskal Wallis analysis for non parametric variables were used. The gross margin was calculated by subtracting variable costs from the gross production value. Variable costs include fertilizers, fuel, pesticides, seeds, water, electricity and labor (Inan, 1994). The family labor was included in variable costs. When making comparisons with other countries, gross margin calculations, in which family labor was included within the variable costs, were taken into consideration (LMC, 2007). The amount of subsidy per unit of cotton both for Izmir and other countries were calculated by dividing the total amount of subsidies allocated for cotton from the national budget by total quantity of national production (only price and income subsidies which were considered received directly by the producer were taken into consideration). The method of calculation explained above was implemented due to differences in applications of subsidies in different countries.

In the study, two logit models were formed in order to investigate the effects on farmers' behaviors of socio-economical factors which affect the possibility of giving up/not giving up cotton production. Another statistical method that can be used in this study is probit analysis. The main difference between logit and probit models is caused by the difference in the assumptions for the distribution of possibilities of models. On the other hand, there is no significant difference between the results obtained by both models (Greene, 2000). However, since it has been accepted that the independent variables explain the dependent variable better in the logit model (Amemiya, 1983), the logit model was preferred in the study, as in the other studies (Ascough *et al.,* 2002; Engindeniz, 2007). The dependent variable in the logit model is discontinuous and the predicted possibility values vary between 0 and 1. The logit model based on the cumulative logistic possibility function is formulated as follows (Gujarati, 1995):

$$P_i = F(z_i) = F(\alpha + \beta X_i) = \frac{1}{1+e^{-(zi)}} = \frac{1}{1+e^{-(\alpha+\beta X_i)}} \quad [2]$$

Where P_i= i' possibility for *i* numbered individual to chose an option; *F*= cumulative possibility function, z= $\alpha+\beta X_i$, α= constant coefficient, β= parameter to be predicted for each explaining (independent) variable, X_i= i' expresses *i* numbered independent variable.

By reorganizing and taking the natural logarithm of both sides of the above given equation, Eq. [3] is obtained:

$$L = \ln\left[\frac{P_i}{(1-P_i)}\right] = z_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots \dots + \beta_3 X_3 \dots \dots + \beta_n X_n \quad [3]$$

In this regression model, the dependent variable z_i, expresses the natural logarithmic value of the ratio of choosing an option to not choosing. In other words, coefficients obtained from the logit model express the possibility of preferring an action against not preferring.

The dependent variable z_i in the logit model formed in this study is the possibility of giving up/not giving up cotton production. For the farmers unlikely to give up cotton production, the dependent variable is given the value 1, otherwise, it is given the value 0. To be able to decide on whether a regression model is sufficient, the most common criteria/indicator for the quality of the adequacy/conformity is the definiteness coefficient. Although the definiteness coefficient is commonly used in classic regression models for the adequacy of conformity, it is not considered a good indicator/criteria in dummy dependent variable models (shadow). Therefore, for dummy dependent variable models, alternative adequacy/conformity criteria are used. The most appropriate strategy in choosing models is to compare the results determining two or three criteria (Amemiya, 1981). One of these criteria is the Akaike Information Criterion. This criterion is useful in comparison of different models. When choosing a model, together with this criterion, log-likelihood and probability statistics (probability, LR stat) may be used. LR statistic is the counterpart in double preference models of the statistic F in linear regression models. It tests the significance of the model as a whole. Probability LR statistic on the other hand is the P value of LR statistic. While the smallest values of Akaike information criterion and probability LR statistic can be taken into consideration in choosing models, the largest values of log-likelihood statistic can also be taken into account.

In this study, a total of ten explaining variables for two logit models were used. These variables are given in Table 1. Variables include social characteristics [age of producer (AGE), education level of producer (EDU), cotton grow experience of producer (CEP), family size (FS)] of the farmers and structural/economical characteristics [farm size (FSIZE), the area of cotton plantations (ACP), producer price (PP), variable costs (VC), gross margin obtained from cotton (GM), and satisfaction from the premiums for cotton (SPC)]. Studies which formed different models by way of classifying

Table 1. Using variables in logit model and descriptive statistics of the variables

Dependent variable (Z_i)			

The farmers unlikely to give up cotton production=1
The farmers likely to give up cotton production=0

Independent variables (X_i)	Units	Mean	SD
1st model, social variables model (X_i)			
-Age of producer (AGE)	Year	48.94	9.763
-Education level of producer (EDU)	Year	6.58	2.764
-Cotton grow experience of producer (CEP)	Year	31.46	9.798
-Family size (FS)	Person	5.28	2.764
2nd model, structural/economic variables model (X_i)			
-Farm size (FSIZE)	ha	15.36	18.475
-The area of cotton plantations (ACP)	ha	7.50	9.365
-Price (producer price) (PP)	€ kg^{-1}	0.47	0.263
-Variable costs (VC)	€ ha^{-1}	1446.50	500.260
-Gross margin obtained from cotton (GM)	€ ha^{-1}	524.40	285.350
-Satisfaction from the premiums for cotton [dummy variable (SPC)]	Satisfaction=1 Unsatisfaction=0		

SD: standard deviation

the same dependent variable with variables of different characteristics have been noticed among the studies using logit and probit models (Sen, 2004; Isin *et al.,* 2007).

Below is the logit function formed for two models:

$$L= \ln \left[\frac{P_i}{(1-P_i)} \right] = z_i = \alpha + \beta_1 AGE + \beta_2 EDU + \beta_3 CEP + \beta_4 FS + u_i$$

[Model 1]

$$L= \ln \left[\frac{P_i}{(1-P_i)} \right] = z_i = \alpha + \beta_1 FSIZE + \beta_2 ACP + \beta_3 PP + \beta_4 VC +$$
$$+ \beta_5 GM + \beta_6 SPC + u_i$$

[Model 2]

It has been assumed in this study that young, educated but inexperienced (in terms of cotton production) farmers with small number of family members might be likely to give up cotton production because they can grow more profitable crops. Furthermore, the small number of family members, which means a smaller family labor force, might also have an effect on their decision to give up cotton production.

When structural/economical characteristics are examined, it is considered that farmers with small total area and farmers with a small area of cotton plantation are more likely to give up growing cotton because farmers with large total area and those with large cotton plantation area will be able to grow cotton as well as alternative crops. Other variables (low price, low profit, high variable costs, being unsatisfied with pre-

miums) are also predicted to be inversely effective on possibility of giving up/not giving up cotton production.

Results

Within the handled farms, the average age of the producers is 49; average education level is 7 years; average cotton growing experience is 31 years and average number of family members is 5.

In this study, the average farm size was determined as 15.36 ha and 49% of which were planted with cotton.

The decrease in the area of cotton planted areas in years 2000-2005 was 64.87%. In the same farms, the area allocated for cotton decreased by 44% in the years 2000-2006. In the same period the greatest decrease in the area of cotton plantations, by 64%, was observed in group 1 (Table 2). According to the farmers, some of the most important reasons for the decrease in the area of cotton plantations are the decrease (55%) in the producer prices and the cost (36%) of growing cotton.

The reasons for farmers to continue cotton farming are: because it is traditionally common (51%); the soil and climate are suitable (29%); it is profitable (9%) and because their equipment is suitable for cotton farming (2%).

While producer price for unginned cotton in the study area was €608 Mg^{-1} in the year 2004, it was €469

Table 2. Changes in the area of cotton plantations (ha). Years 2000–2006

Farm size groups[1]	2000	2001	2002	2003	2004	2005	2006
Group 1 ($x<5$)	6.63	6.71	6.88	6.61	4.95	2.31	2.41
Index[2]	100.00	101.40	104.04	99.86	74.81	34.84	36.39
Group 2 ($5 \leq x < 10$)	10.30	10.12	9.79	9.02	8.33	6.22	4.80
Index[2]	100.00	98.16	94.92	87.49	80.84	60.33	46.52
Group 3 ($x \geq 10$)	26.78	25.73	24.33	24.23	22.09	19.83	17.31
Index[2]	100.00	96.08	90.85	90.48	82.48	74.04	64.65
Average	14.57	14.19	13.67	13.29	11.79	9.45	8.17
Index[2]	100.00	97.38	93.81	91.19	80.93	64.87	56.09

[1] The farms were evaluated in three groups depending on their sizes in 2005. [2] Base year 2000.

Mg^{-1} in 2005 (a decrease by 23% is observed). No difference ($p=0.762>0.01$ for 2005 and $p=0.725>0.01$ for 2004), in terms of producer prices, have been detected.

Gross margin and subsidies play important roles in farmers' decisions about how great an area to allocate for cotton. In the farms included in the study, the average variable cost was €1,446.6 ha^{-1}. The most important proportion within total variable costs is taken by labor cost at 54% followed by fuel at 14%. The gross margin was calculated as €524.4 ha^{-1} (Table 3). When the gross margin is examined at group level, it is observed that the gross margin is negative for group 1, which means they cannot afford variable costs and lose money, and therefore the importance of premiums emerges. In 2005, among the producers who benefited from premiums (for unginned cotton), those who used non-certified seed received €0.174 kg^{-1} and that who used certified seed received €0.191 kg^{-1}.

According to the results of the study, the gross margin for Izmir province (Ege Region/Western Anatolia) has been calculated as €524.4 ha^{-1}. According to the results of this study, the average cotton yield for Izmir is 4,018 kg ha^{-1} (3,858.5 kg ha^{-1} for group 1; 3,960.4 kg ha^{-1} for group 2 and 4,078.1 kg ha^{-1} for group 3).

In the examined farms, 75% of the farmers stated that they would give up cotton farming completely unless there are subsidies. In terms of subsidies, 48% of farmers expect subsidies for inputs; 39% expect the premiums to be increased and paid earlier; the producer price to be announced before cotton is planted and subsidies to be at EU standards.

Amongst farmers, 69% stated that they were not satisfied with the premiums and that the amount of premiums should be raised to €0.364 kg^{-1}. There were no difference among the groups in terms of the demand for the amount of premiums ($p=0.752>0.01$).

They also added that in case of giving up cotton farming, they would shift other crops and produces such as feed (40%), vegetables (28%) and other crops (32%). One of the most important reasons for farmers to shift crops in this way is the increase in the subsidies for feed crops and livestock in recent years.

Table 3. Variable costs, gross production value and gross margin in the examined farms

Farm size groups	Variable costs (€ha^{-1})							Gross production value (€ha^{-1})	Gross margin (€ha^{-1})
	Labor costs[1]	Fuel costs	Fertilizer costs	Pesticide costs	Seed costs	Water, electricity and other variable costs	Total variable costs		
Group 1 ($x<5$)	907.07	408.78	328.31	56.85	51.93	263.54	2016.49	1772.01	-244.48
Group 2 ($5 \leq x < 10$)	853.06	291.43	183.13	33.50	49.96	227.05	1638.14	1847.70	209.55
Group 3 ($x \geq 10$)	770.59	193.35	177.93	28.41	52.16	193.85	1416.28	1986.00	569.71
Average[2]	779.72	205.51	181.98	29.47	52.00	197.89	1446.55	1970.99	524.44
Percentage in total costs	53.90	14.21	12.58	2.04	3.59	13.68	100	-	-

[1] Harvest labor costs are included. [2] Weighted average was calculated by considering farm size.

Results of logit model

Prediction results of two logit models are shown in Tables 4 and 5. In the model, social variables such as the education level of the producer, the cotton growing experience of the producer and family size, together with structural and economical variables such as farm size, satisfaction from premium system and the gross margin, have been found to be significant as 0.05. The social variable, farmer's education level, and the structural/economical variable and farm size all negatively affect the possibility of giving up/not giving up cotton production; all other variables have positive effects. In other words, the decrease in education level of producer and farm size is accompanied by an increase in the cotton growing experience of producer, family size, satisfaction from premiums and increased gross margin, increase the possibility of giving up/not giving up cotton production. It is significant that farmers shift to alternative crops because of applied policies and the increase in their level of education. Producer prices for cotton were not found to be significant. This can be explained with TARIS's price policy of base price system. While control percentage of TARIS in cotton market in Ege region is 43%, it is 37% in the province of Izmir, and this means that TARIS effects the price creation. TARIS prices the cotton depending on the quality taking 40% fiber yield the base. For each change in the percentage, the price changes by 2%. In fact, there is no price difference among the groups (p=0.762>0.01). On the other hand, however, 55% of the farmers stated that one of the most important reasons for them to give up cotton farming in recent years has been TARIS's setting of low base prices for cotton.

Gradient coefficients in the model measure the effect on the dependent variable per unit of change in the explaining variable. In this regard, when social and structural/economical variables are investigated in terms of their effects on the possibility of giving up/not giving up cotton production, these statements can be made:

When the gradient coefficient in social variables is examined, the effect on the possibility of giving up/not giving up cotton production of family size is seen to be greater than those of other two variables (the education level of producer and cotton-growing experience of the producer). Cotton farming is a labor-intensive activity and mechanized harvesting is not common in the area; thus, the family labor force is important in cotton farming in Izmir area.

As for the structural/economical variables (Table 5), the change in gross margin affects possibility of giving up/not giving up cotton production more than changes in other two variables (farm size and satisfaction from premiums). In fact, since the farmers in Turkey receive their premiums long after the harvest (at least six months), their tendency for taking the gross margin more seriously is significant.

Discussion

When social variables (age: 49, education: 7 years, number of family members: 5, farming experience: 31 years) of the establishments included in the study was compared with those (age: 46, education: 7 years, number of family members: 5, farming experience: 30 years) of a study undertaken in the year 2000, no significant change in the past five years was observed (Uzmay, 2003).

Table 4. Statistical results of first logit model with social variables

Dependent variable

The farmers unlikely to give up cotton production=1
The farmers likely to give up cotton production=0

Independent variables (X_i)	Coefficient	SD	z-Statistic	Prob.
Constant	-3.096604	1.077298	-2.874417	0.0040
Age of producer	0.079655	0.107487	0.741067	0.4587
Education level of producer	-0.008202	0.003670	-2.235190	0.0254
Cotton grow experience of producer	0.015316	0.006009	2.548789	0.0108
Family size	0.067284	0.029894	2.250753	0.0244

Log likelihood=-48.15447. Probability (LR stat) = 0.010401. Akaike info criterion = 1.265583. Mcfadden R-squared (R^2) = 0.120427, significant at the 0.05 level. Total observations = 84. Observations with Dep. (0): 54. Observations with Dep (1): 30.

Table 5. Statistical results of second Logit Model with structural/economic variables

Dependent variable

The farmers unlikely to give up cotton production=1
The farmers likely to give up cotton production=0

Independent variables (X_i)	Coefficient	SD	z-Statistic	Prob.
Constant	-3.564868	1.978578	-1.801733	0.0716
Farm size	-0.008215	0.003769	-2.179425	0.0293
The area of cotton plantations	0.066194	0.105837	0.625434	0.5317
Price (producer price)	0.002462	0.004820	0.510663	0.6096
Variable costs	2.031887	1.624548	1.250739	0.2110
Gross margin obtained from cotton	0.065366	0.030587	2.137068	0.0326
Satisfaction from the premiums for cotton	0.013857	0.006227	2.225356	0.0261

Log likelihood=-47.11312. Probability (LR stat) = 0.018265. Akaike info criterion = 1.288408. Mcfadden R-squared (R^2) = 0.139448, significant at the 0.05 level. Total observations = 84. Observations with Dep. (0): 54. Observations with Dep (1): 30

While areas planted with cotton constitute 49% of the cultivated area of subject farms, a noticeable average of 84.85% in the year 2000 was planted with cotton (Uzmay, 2003). In fact, while the number of cotton farms in the same area in the year 2000 was 1,393 (MARA, 2001), it decreased to 647, a decrease of 54%, in the year 2005 (MARA, 2006b).

The most important reason cited by the farmers for producing cotton in the year 2000 was its status as the most profitable crop (39%). Other reasons were: guaranteed marketing (22.5%); its being traditional (17.5%) and the suitability of soil and climate (12.5%) (Isin, 2000). In this case, while profitability was more important for producers in the year 2000, traditionalism as a reason became more important in the year 2006.

For the Manisa province, also in the Ege Region (Western Anatolia), it is €554.8 ha^{-1}. It is €327.4 ha^{-1} in Adana province (South-Eastern Anatolia) and €108.0 ha^{-1} in Antalya province (Mediterranean Region). According to the results of the study, the gross margin has been calculated as €524.4. The differences in gross margin values are due to yield per unit of land and cost differences (AERI, 2001). In fact, the average cotton yield in the Manisa province is 4,000 kg ha^{-1}; 3710 kg ha^{-1} in the Adana province and 3,040 kg ha^{-1} in the Antalya province (AERI, 2001). According to the results of this study, the average cotton yield for the Izmir region is found 4,018 kg ha^{-1}. The fact that results for both the average cotton yield and average gross margin are very close for the Izmir and Manisa provinces enables a generalization for Western Anatolia.

The same variables for the year 2005 have been compared with the EU countries (Turkey is a candidate country) and the USA (Table 6). As it is seen in the table, the unginned cotton producer prices for Izmir province are higher than the ones in the USA but con-

Table 6. Gross margin and subsidies for unginned cotton in Izmir and some selected countries. Year 2005

	Gross Margin (€ ha^{-1})	Variable costs (€ ha^{-1})	Yield of cotton (kg ha^{-1})	Price of cotton (€ kg^{-1})	Subsidy amount[1] (€ kg^{-1})	Gross margin (€ kg^{-1})	Sum of gross margin and subsidy (€ kg^{-1})
Turkey (Izmir)	524.4	1446.5	4018.00	0.469	0.155	0.130	0.285
Greece (Thraki)	917.4	1721.0	3145.05	0.839	0.506	0.292	0.798
Greece (Ipiros)	1394.0	1770.0	3649.60	0.867	0.506	0.382	0.888
Spain	1136.0	2654.3	4175.00	0.908	0.441	0.272	0.713
USA[2]	290.4	484.6	2289.25	0.339	0.215	0.127	0.342

[1] The amount of subsidies for countries have been calculated by dividing the total (direct price and subsidies given to the producer only for cotton) amount given to the producers by national production total. [2] 1 kg unginned cotton has been taken = 0.4 kg fiber; cotton fiber price/unginned cotton price has been taken = 2.5; unginning cost which remains in the source has been taken out of variable costs. Source: LMC (2007), EWG (2008), USDA (2008a,b).

siderably lower than the EU prices. According to the study, the gross margin for the Izmir province is 143% lower than the ones in the EU countries but 2.3% higher than the ones in the USA. The average cotton yield for Izmir is lower than Spain but higher than in Greece and the USA. Variable costs are lower than those of EU countries but higher than in the USA. When a comparison in terms sum of gross margin and subsidies of countries is made, the EU with 181% and the USA with 20% has a higher sum of gross margin and total subsidies than the Izmir province. Therefore, it can be stated that producers in the EU and the USA find cotton farming more advantageous.

While the priority of the farmers during this study was subsidies for inputs since subsidies for inputs were in practice in the year 2000, the farmers expected the producer prices to be raised (Uzmay, 2003).

In this study, the decrease in the area of cotton plantations in the province of Izmir has been determined to be at serious levels. According to farmers, the most important reason for this development is the decrease in producer prices and the increase in costs. Farmers are continuing to grow cotton not because it's profitable, but because it is traditional.

According to the results of the logit model formed in this study, social variables such as the education level of farmers, the cotton growing experience of the farmers and their family size together with structural/economical variables such as farm size and being unsatisfied with the premium system and the gross margin were found to be significant at 0.05. The social variable such as education level of farmers and the structural/ economical variable, farm size affect the possibility of cotton production reversely but all others, positively.

In this study, the gross margin calculated for cotton in the province of Izmir was higher than other regions of the country. But on the other hand, farmers in Izmir, especially small farmers, cannot cover the variable costs and are losing money. As a matter of fact, it has been concluded that unless the subsidies are increased in favor of cotton, farmers in the region will continue to give up cotton production. When the gross margin and subsidy values for Izmir and those in the EU and the USA are compared, it is observed that farmers in the EU and the USA experience more advantageous conditions than the farmers in Izmir region. Therefore, it is obvious that in order to increase cotton-planted areas in Turkey, a constant, long term cotton production and subsidy policy with defined objectives and tools is needed.

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