

## 6. Interaction of Subsidy Reduction and Direct Income Support Program

6.1 This chapter summarizes the impact of the agricultural subsidization reform and DIS program on crop area changes, rural productivity and income in 2001-2002. Specifically, it sets out to answer three questions: who participated in the DIS program; was there a shift in production from crops with price supports to crops without price supports; and what has been the impact of cash transfers on agricultural income?

### A. *Quantitative Household Survey Data*

6.2 The data set used to examine changes in the structure in crop areas and in farmer welfare comes from a household survey (known as the ARIP Quantitative Household Survey, or QHS) of 5508 village households conducted in 500 rural Turkish villages in November-December 2002. This survey was designed to be representative of farming households (in all of Turkey's seven regions) which were engaged largely in cultivation of the formerly most highly subsidized crops (tobacco, sugarbeet, hazelnut, and grains).<sup>22</sup> There are three important caveats in the data worth noting for this analysis.

6.3 Poverty measure. For the purposes of this analysis the poor are defined as the bottom third of the per capita consumption expenditure distribution and non-poor as the top two-thirds. This is equivalent to a poverty line of 1.4 billion TL per capita per year in 2002.

6.4 Applied versus received DIS. The QHS included questions on applications for DIS in 2001 and 2002 and whether or not payments were received. Ninety-four percent of households that applied for DIS in 2001 received payments, but only 23 percent that applied in 2002 received payments. This is because DIS disbursements lag several months behind application. Given the very high share of households in 2001 that received payments once they applied, those that "applied" rather than "received" DIS are used to construct the measure of household participation in the 2002 DIS program.

6.5 Reported versus calculated DIS payments. In the questionnaire, households reported the amount of DIS received over the last year. This can be compared with a calculation of the amount they should have received based on their land holdings. Reported and calculated DIS are highly correlated, but the reported DIS payment is consistently higher. A number of explanations are possible for this over-reporting, but the most likely is that the survey was conducted almost a year after the first set of payments was made, and respondents may have had difficulty recalling exactly how much they received. While this difference warrants closer investigation, the remainder of the analysis relies on reported DIS payments.

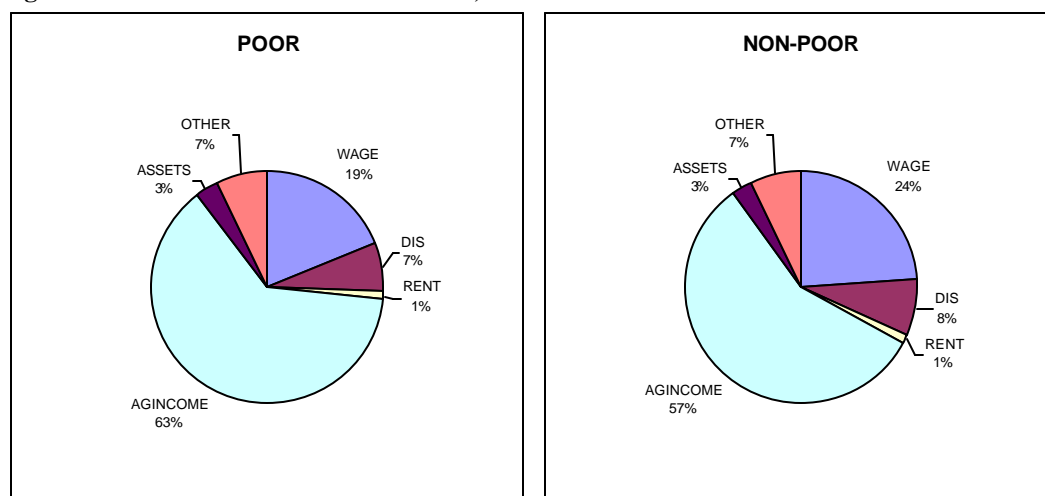
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<sup>22</sup> The sampling method employed was cluster sampling, prepared according to eight project crops: wheat, tobacco hazelnut, sugarbeet, maize, cotton, olives and tea. Four hundred and ninety nine villages were selected by random sampling from the lists of State Institute of Statistics (SIS) that are divided according to regions where crops are grown. The sample has 71 provinces: 11 in Marmara region, 13 in Central Anatolia, 6 in the Aegean, 12 in the Mediterranean, 6 in Southeast Anatolia, 10 in East Anatolia, and 13 in the Black Sea region. Random selection of the farm holders was based on a "village list" generated after an interview with the *muhtar* (village headman). After completion of village *muhtar* questionnaire, 11 households were selected for interviewing. Agricultural business-households were randomly selected from the village household list with a systematic sampling method while implementing the survey.

## B. Sources of Household Income

6.6 Households had six major income sources in 2002 (Figure 6.1). The single most important was sale of agricultural products (58 percent), followed by wages (20 percent).<sup>23</sup> Comparing income sources for households across the poor and non-poor, Figure 6.1 suggests that there are significant differences. First, wages made up 24 percent of the total income for the non-poor and only 19 percent for the poor, while agricultural income made up 63 percent of income for the poor and 57 percent for the non-poor. DIS payments accounted for a surprisingly high 7 percent of household income, and this share was virtually the same across poor and non-poor alike.

Figure 6.1 - Sources of Household Income, 2002 Across Poor and Non-Poor



Source: 2002 QHS

## C. Familiarity with the Agricultural Reform Program and DIS

6.7 The majority of households (53 percent) indicated they were not familiar with the agricultural reform program. A closer look at the data reveals that there are no systematic differences in knowledge of the reform program between poor and non-poor households, suggesting uniform access to information about the program over the welfare distribution. While households are not familiar with the reform program in general, they are familiar with DIS, and 65 percent view these payments favorably (although 24 percent view them negatively). Again, there are no differences in perception of the program between poor and non-poor households. All land users (owners, renters, and share-croppers) are eligible to apply to DIS, so long as they can demonstrate their land is legally cultivated and is registered in the cadastre or their muhtar (village head) provides an affidavit indicating that they are the legal user of the land. Surprisingly, the survey data (presented in Table 6.1 below) indicate only small, though statistically significant, differences in the land tenure characteristics of the poor and non-poor households.

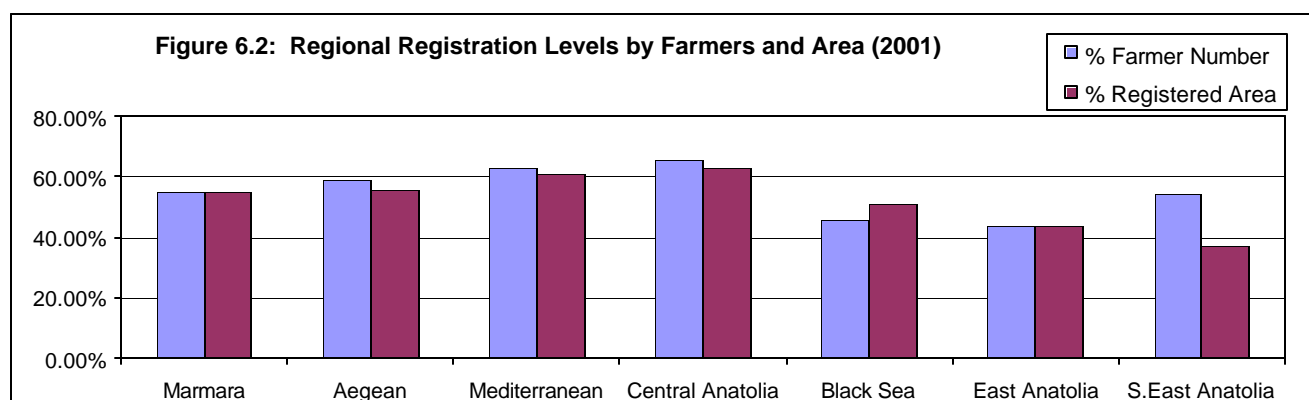
<sup>23</sup> 'Other income' includes income from sources other than agriculture, interest, and aid from family and relatives.

Table 6.1: Shares of Poor and Non-Poor Having Land that Is:	Poor	Non-Poor
Registered in Cadaster	66	72
Not Registered in Cadaster	42	41
Rented	18	24
Share Cropped	6	8

Source: 2002 QHS

#### D. Participation in DIS

6.8 At the launch of the DIS program in 2001, the target was to register 50 percent of the farming households in Turkey by the end of 2002. An analysis of data from the National Registry of Farmers has been made to rate this progress against the benchmarks set out. By Fall 2001, 2.18 million farmers had been registered for the DIS Program, accounting for 121.0 million decares of agricultural land. This amounted to 54 percent of the expected total number of farmers<sup>24</sup> and 50 percent of the total agricultural area. So at the national level the target set out was reached ahead of schedule. However, these ratios by province varied substantially. Examining share of farmers registered, the range was from a low of 11 percent in Bingol to a high of 105 percent in Edirne<sup>25</sup>, while the median share was 51 percent. The registered share of land area varied across provinces almost as much, from only 7 percent in Sirnak to a high of 83 percent in Kirsehir. The median share was 52 percent.



Source: MARA and SIS-1991 Agricultural Census

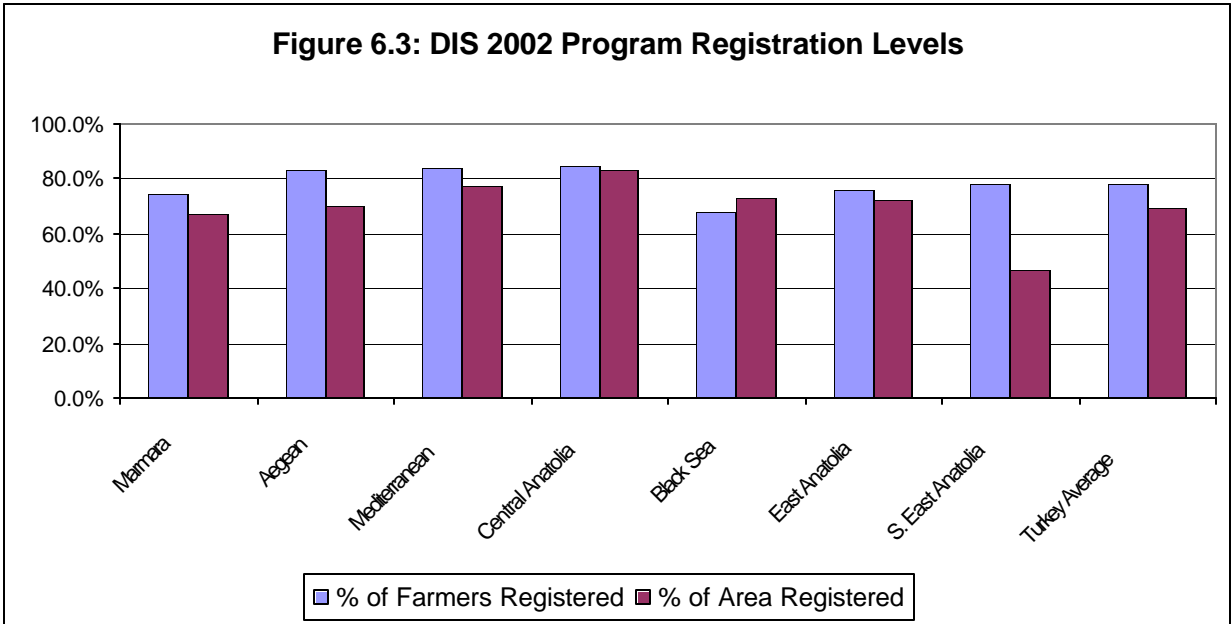
6.9 Figure 6.2 above demonstrates the regional distribution of registration shares for farmers and land areas. The Central Anatolia region had the highest registration shares for both farmers and land areas (65 and 63 percent respectively). The South East Anatolia region had an above average share of farmers registered (54 percent), but was behind all areas with respect to the registered share of land areas. The Black Sea was the only region where the share of farmers registered was below registered share of land areas (46 and 51 percent respectively).

<sup>24</sup> Because of the lack of more recent agricultural census data disaggregated by province on the total number of farmers, 1991 agricultural census data are the source of the denominator (total population of farmers) for the ratio. As a result, this ratio is not entirely accurate, as the farmer population might have changed since 1991. However, the total number of farmers indicated by the 2002 Agricultural Census is roughly constant (4.1 million) as compared to the 1991 Agricultural Census.

<sup>25</sup> It is worth noting that in 4 provinces (Edirne, Gaziantep, Kirsehir and Tekirdag), the ratio of number registered farmers / total farmers is higher than 1, because of the dated nature of the data from the 1991 census and the likelihood that division of farms over time among family members has been unusually frequent in these provinces.

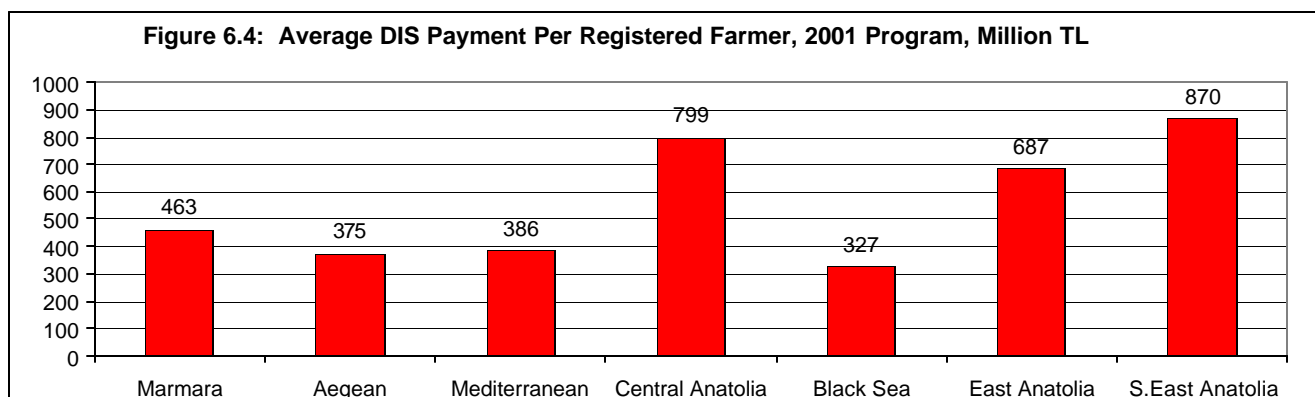
6.10 In 2002, a number of significant differences in the trends of participation in the DIS Program have evolved (see Figure 6.3 below). Using the same base numbers of farmers and land areas, the registered share of farmers rose to 78 percent at the national level, while the registered share of land areas rose to 70 percent. This trend of continued higher shares of registered farmers than land areas was present in each region (except the Black Sea region) and was particularly marked in the South East Anatolia, Aegean, and Marmara regions. In this regard, anecdotal evidence indicate that the frequency of disputed land titles is higher in the South East Anatolia region than average in Turkey. This would mean that many farmers in South East Anatolia could register at least partially in the NRF, without being able to register as much of their land as farmers in other regions manage to register. This would account for the lower registered share for land areas compared to the registered share for farmers.

6.11 Other factors possibly at work influencing the registered area shares' being lower than registered farmer shares are the maximum eligible area cut-off of 500 da for farmers and the fact that corporate farms are ineligible for DIS. The importance of these factors cannot be adequately assessed until the detailed 2002 Agricultural Census results are released by the State Institute of Statistics (SIS), which is expected in 2004.



Source: MARA and SIS-1991 Agricultural Census

6.12 Before moving to an analysis of the registered share for farmers and land areas as revealed by the respondents to the QHS, it is worth briefly highlighting the payment levels by region that were reported from the data in the NRF for 2001-2002. Here, we see that the DIS 2001 Program paid out a total of 1.18 quadrillion TL to the 2.18 million registered farmers. Average payment per registered farmer was 539 million TL (USD 379), and this per farmer payment ranged regionally from 327 million TL in the Black Sea region to a high of 870 million TL in South East Anatolia. (This level in Southeast Anatolia would likely have been even higher were land title disputes less of a problem.) Figure 6.4 shows the regional disparities in average DIS payment per farmer.



Source: MARA

6.13 Participation Rates Revealed in the QHS. Analyzing the replies of respondents to the QHS, we see similar participation rates by farmers as those present in the NRF. The main differences in 2001 were in Marmara, the East Anatolia, and South East Anatolia regions, where the rates reported from the QHS sample were substantially above those reported in the NRF, by 10-15 percentage points in each case. These differences narrowed substantially in 2002 in the Marmara, Black Sea and Eastern Anatolia regions, but grew in the Aegean, Mediterranean, and Southeast Anatolia. Again, since the 1991 Agricultural Census is the source of the data for the total population of farmers, these differences may be explained by differential trends in the evolution of the actual number of farmers in the various regions.

**Table 6.2: DIS Farmer Participation Shares by Region**

Region	Poverty incidence	2001 QHS	2001 NRF	2002 QHS	2002 NRF
Marmara	22	67	55	70	75
Aegean	31	59	59	66	83
Mediterranean	50	49	63	56	84
Central Anatolia	29	73	65	77	85
Black Sea	58	52	46	64	68
Eastern Anatolia	60	58	44	70	76
S. E. Anatolia	15	63	54	67	78

Source: 2002 QHS

6.14 The QHS data allow us to investigate the impact of farmers' characteristics on DIS participation. First, on the basis of sub-samples in the QHS data, it is clear that participation rates increased uniformly for the poor and non-poor from 2001 to 2002. Still, regional participation rates and regional poverty incidence are negatively correlated: -0.70 (QHS) or -0.78 (NRF) in 2001, and -0.33 (NRF) or -0.37 (QHS) in 2002, respectively. Literacy does not appear to have been an issue, as participation rates between the literate and illiterate sub-samples were uniform. A cross tabulation of participation rates by eligibility criteria also reveals that there is no systematic difference in the participation rates of farmers with different size land holdings.

6.15 However, there are significant differences in participation rates across the types of land holdings. Fifty-six percent of households with land registered in the cadastre participate in the DIS. Only 16 percent of households with land not registered in the cadastre, 5 percent of

households with rented land, and less than one percent of sharecroppers participated in the program. The most common reason cited by households for not participating in DIS is that they did not believe they were eligible to enter the program. Thus, improving dissemination of information on eligibility criteria, particularly in areas with high numbers of sharecroppers and farmers with land not registered in the cadastre, may help raise the participation rates.

6.16 A multivariate analysis of the determinants of participation in the DIS program reveals that the variables for cadastered land, knowledge of reforms, and access to credit are significant positive determinants of participation (see Table 6.3 below). Indeed, having land registered in the cadaster is the most significant positive determinant of participation. To measure the impact of differential regional propensities to participate, the Mediterranean region is omitted from the regression. The effect of the remaining regions on participation is positive and significant, in line with the results reported in Table 6.2 on the QHS-based participation shares. Surprisingly, size of land holding does not have a substantial impact on participation. Likewise, neither the level of household expenditure nor the “poor” dummy variables have substantial impacts on participation, confirming the weak link between poverty and DIS participation.

**Table 6.3: Results from Logistic Regression about DIS participation**

Variable Name	Description of Variable	Mean	Odds Ratio
Apply/Not apply	dependent variable	0.56	
Household Income**	in million TL	7098.63	1.000
Household Cultivated Land**	in decares	81.65	1.000
Poor Household	dummy variable = 1 if poor	0.33	0.884
Cadastered Land**	dummy variable = 1 if cadastered	0.71	2.728
Household Literacy	dummy variable = 1 if head is literate	0.91	0.977
Household Size**	number of people in a household	5.85	1.032
Knowledge of Reforms**	dummy variable = 1, if have heard of the reforms	0.07	1.518
Access to credit**	dummy variable	0.32	1.838
Access to technical assistance	dummy variable	0.04	1.075
		0.17	2.207
Central Anatolia**	regional dummy		
		0.25	1.254
Black Sea*	regional dummy		
		0.19	1.405
Aegean**	regional dummy		
		0.13	2.552
Marmara**	regional dummy		
		0.06	1.685
East Anatolia**	regional dummy		
		0.09	2.029

Source: 2002 QHS and own analysis.

\* significant at 5 percent level of significance, \*\* significant at 1 percent level of significance

6.17 In conclusion, the results from the QHS suggest that participation close to the rates targeted under the Program have been achieved. While there are few differences in participation in the Program by location and welfare status, a potential target area to improve participation is to improve the dissemination of information on eligibility criteria, particularly in areas with farmers whose land is not registered in the cadastre. This may help raise the participation rates.

### ***E. Impact of Shifts in Crop Production Patterns and the DIS Program***

6.18 This section addresses the issue of whether or not farmers shifted production from crops with formerly high price supports to those crops without price supports that have consequently

not seen large falls as a result of policies in the agricultural reform period. All else being equal, the expectation is that farmers will decrease the production of crops with formerly high levels of support and increase production of crops without supports. Having only one year of cross sectional household data makes this very difficult to measure. However, it is possible to aggregate the 2002 household data to the regional level and compare this with SIS regional data on the share of the area sown under different crops in 2001.<sup>26</sup> While this is a crude measure, the difference in the shares in 2001 and 2002 provides a preliminary indication of the shift in production patterns at the regional level (Table 6.4).

6.19 The results indicate that the share of agricultural land sown to grains (mainly wheat and barley) have fallen about 2.0 percentage points (a 4 percent reduction), while the shares to sunflower and fruits and vegetables have increased by about 2.4 and 1.2 percentage points, respectively<sup>27</sup>. This is in line with what would be expected as a result of the agricultural reform policies which led to significantly reduced grain support, as well as greater attractiveness of fruits and vegetables (largely unsupported crops in the past and currently) and sunflower seed (which is still accorded high support). These results also represent an acceleration of the shifts reported in para. 5.16 for the period 1999-2001.

**Table 6.4: Changes in Crop Area Shares, 2001- 2002, Regionally and Nationally**

From QHS Sample– 2002	Marmara	Aegean	Mediterranean	Central Anatolia	Black Sea	East Anatolia	S. East Anatolia	Turkey Total
Tobacco	0.3%	6.6%	0.1%	0.0%	1.7%	0.4%	1.5%	1.5%
Wheat	43.0%	22.3%	53.0%	54.6%	22.7%	51.3%	45.8%	43.0%
Maize	2.1%	4.9%	10.2%	0.5%	7.0%	0.4%	0.7%	3.5%
Barley	5.5%	11.9%	2.4%	27.3%	3.5%	28.5%	13.9%	14.3%
Sunflower	30.2%	0.2%	0.8%	2.3%	1.2%	0.0%	0.0%	4.9%
Sugarbeet	0.5%	7.9%	0.5%	5.4%	2.5%	3.9%	0.0%	3.3%
Fruits and Vegetables	9.5%	16.1%	16.2%	9.2%	57.0%	4.1%	13.6%	17.0%
<b>2001 Base Data</b>								
Tobacco	0.6%	4.1%	0.3%	0.0%	1.2%	0.2%	0.5%	0.9%
Wheat	47.6%	31.8%	51.1%	52.4%	36.5%	54.3%	39.8%	45.0%
Maize	1.9%	1.8%	8.5%	0.1%	10.0%	0.1%	0.3%	2.7%
Barley	6.4%	16.1%	6.1%	25.5%	9.7%	21.0%	24.5%	17.6%
Sunflower	16.5%	0.8%	0.9%	0.9%	0.9%	0.2%	0.1%	2.5%
Sugarbeet	0.5%	1.2%	0.8%	2.9%	2.4%	2.8%	0.0%	1.7%
Fruits and Vegetables	16.9%	29.8%	18.6%	5.6%	25.0%	7.1%	16.2%	15.8%
<b>2002-2001 Difference</b>								
Tobacco	-0.3%	2.5%	-0.2%	0.0%	0.5%	0.2%	1.0%	0.5%
Wheat	-4.6%	-9.6%	2.0%	2.1%	-13.8%	-3.0%	6.0%	-2.0%
Maize	0.2%	3.1%	1.7%	0.4%	-2.9%	0.2%	0.4%	0.9%

<sup>26</sup> Crop Share =  $\frac{\text{landincrop}_{ik}}{\text{totalland}_k}$  where i is crop and k is region.

<sup>27</sup> The QHS data indicate that sugarbeet in the Aegean has increased significantly while the area in fruits and vegetables has fallen significantly relative to 2001 base levels. This is implausible and indicates a respondent problem (mis-coding of answers) or a sampling problem in the Aegean region. If these two share were more in line with those observed in 2001 at the province level, then the national sugarbeet area would have been stable nationally, and fruits and vegetables would have showed a large increase. These issues are being investigated in tandem with the firm executing the multi-year QHS.

Barley	-0.9%	-4.1%	-3.7%	1.9%	-6.2%	7.5%	-10.6%	-3.3%
Sunflower	13.7%	-0.6%	-0.1%	1.4%	0.3%	-0.2%	-0.1%	2.4%
Sugarbeet	0.0%	6.7%	-0.3%	2.5%	0.1%	1.2%	0.0%	1.6%
Fruits and Vegetables	-7.5%	-13.7%	-2.4%	3.6%	32.0%	-3.0%	-2.6%	1.2%

Source: SIS and 2002 QHS.

6.20 An alternative strategy to identify shifting crop production patterns is to try and determine how specialized a farmer is in a given crop and then determine whether he/she is becoming more or less specialized over the course of the reform. This can be done by taking a ratio of the share of area sown in a given crop for a household and the share of area sown in a given crop for the region.<sup>28</sup> The interpretation is that if this ratio is greater than 1 then the household is more specialized in the crop than the average household in the region. If it is less than one then they are less specialized<sup>29</sup>.

6.21 These variables were constructed for a number of crops (tobacco, wheat, maize, barley, sunflower, sugarbeet, and fruits and vegetables) and used in a model designed to explain the impacts of area shifts observed in the reform period and the DIS Program on agricultural income levels (among the QHS respondents). Given the implausible crop area shifts revealed by the QHS data (discussed above for the Aegean region in footnote 27), and the need to make the model results more readily interpretable, the cross specialization variables were used in the model as dummies: where an individual's crop specialization (area share) for a given crop exceeded that of the area average, the value of that crop specialization dummy for that household assumed a value of 1. Agricultural income was measured using gross agricultural revenue (as adequate information on input costs could not be compiled yet from the QHS), and the full model was specified as follows:

$$\begin{aligned} \text{Gross Agricultural Income} = & \mathbf{b}_1 \text{ Amount of DIS Received in 2001} + \mathbf{b}_2 \text{ Crop Specialization Dummies} + \\ & \mathbf{b}_3 \text{ Cultivated Land} + \mathbf{b}_4 \text{ Knowledge of Reforms} + \mathbf{b}_5 \text{ Literacy} + \mathbf{b}_6 \text{ Cadastered Land} + \mathbf{b}_7 \text{ Household Size} + \\ & \mathbf{b}_8 \text{ Credit} + \mathbf{b}_9 \text{ Access to Technical Assistance} + \mathbf{b}_{10} \text{ Region Dummies} + \text{error term} \end{aligned}$$

6.22 In deriving the estimates for the impact of crop specialization dummies, the full model was run (using the OLS estimator). The results indicate that those households with greater relative wheat specialization, tobacco specialization, and barley specialization all experience a significantly negative impact on agricultural income. These findings are in accordance with the expected results since tobacco prices have fallen the most of all crops, and the PSEs for wheat and other grains (mainly barley) fell from over 40 percent in 1999 to near zero for both in 2001. The other specialization variables with significant coefficients are those for sunflower, maize, and sugarbeet. For sunflower the variable is significantly positive as expected, as the PSE has been consistently over 25 percent. For fruits and vegetables, there is likely to much

<sup>28</sup> The formula takes the following form: (land under cultivation under crop i by household j/total land cultivated by household j in 2002) / (land under cultivation under crop i in region k/ total land under cultivation in region k in 2002)

<sup>29</sup> A potential problem is that this variable likely suffers from aggregation bias – it may not be possible to make an accurate inference about individual behavior based on a regional aggregate. Ideally, in order to examine the shift in crop specialization we would examine the household level crop pattern in 2001 and 2002. It would then be possible to construct crop specialization measure for both years and compare the shifts in crop specialization.

contradictory price movement within the group, as it contains hazelnuts (the price of which has come down significantly in 1999-2001 as a result of reduced state support purchases), while other fruit and vegetable prices are largely deregulated and stable.

**Table 6.5: Impact of Crop Specialization on Gross Agricultural Revenue**

Variable	Description of Variable	Mean	Coefficient
Agricultural revenue	in million TL	4111.88	
Amount of DIS**	in million TL	425.72	2.94
Tobacco_spec**	specialization dummy for tobacco	0.25	-790.41
Wheat_spec**	specialization dummy for wheat	0.44	-1158.70
Maize-Spec**	specialization dummy for maize	0.12	628.97
Barley_spec**	specialization dummy for barley	0.21	-1037.86
Sunflower_spec	specialization dummy for sunflower	0.12	2041.90
Sugarbeet_spec**	specialization dummy for sugarbeet	0.18	1806.95
Fruits&Veg_Spec	specialization dummy for fruits and vegetables	0.36	-178.56
Cultivated Area**	in decares	81.65	4.19
Cadastered land	dummy variable = 1 if cadastered	0.71	311.02
Literacy**	dummy variable = 1 if head of household is literate	0.91	1034.87
Household Size**	number of people in a household	5.85	124.25
Knowledge of reforms	dummy variable = 1, if they had heard of the reforms	0.07	36.68
Access to Credit**	dummy variable	0.32	1363.56
Access to technical assistance**	dummy variable	0.04	2399.28
Aegean	regional dummy	0.19	443.33
East Anatolia**	regional dummy	0.06	-4603.70
Central Anatolia**	regional dummy	0.17	-1129.01
Black Sea**	regional dummy	0.25	-1757.46
Marmara**	regional dummy	0.13	-61.25
SE Anatolia**	regional dummy	0.09	-1497.85
Intercept			1396.66

significant at 5 percent level of significance, \*\* significant at 1 percent level of significance  
Source: 2002 QHS and own analysis.

6.23 The main contradictory findings concerns sugarbeet and maize specialization. The PSEs for sugarbeet prices and maize have been both fallen substantially, but the corresponding specialization variables have significantly positive impacts on agricultural income. Other variables that have a significantly positive impact on income are cultivated area, literacy, household size, access to credit, and access to technical assistance. The regional dummies are all significant (except those for the Aegean and Marmara).

**Table 6.6: Impact of DIS Participation on Gross Agricultural Revenue**

Variable	Description of Variable	Mean	Coefficient
Agricultural revenue	in million TL	4915.988	
Amount of DIS**	in million TL	740.102	4.08
Tobacco_spec**	specialization dummy for tobacco	0.277	-1,303.32
Wheat_spec**	specialization dummy for wheat	0.488	-1,409.51
Maize-Spec	specialization dummy for maize	0.109	280.54
Barley_spec**	specialization dummy for barley	0.244	-1,467.87
Sunflower_spec	specialization dummy for sunflower	0.137	708.71

Sugarbeet_spec**	specialization dummy for sugarbeet	0.202	1,454.92
Fruits&Veg_Spec	specialization dummy for fruits and vegetables	0.342	-331.86
Cultivated Area**	in decares	98.298	3.73
Cadastered land **	dummy variable = 1 if cadastered	0.813	1,022.64
Literacy**	dummy variable = 1 if head of household is literate	0.916	1,364.58
Household Size**	number of people in a household	6.014	121.42
Knowledge of reforms	dummy variable = 1, if they had heard of the reforms	0.072	-10.55
Access to Credit**	dummy variable	0.391	1,385.26
Access to technical assistance**	dummy variable	0.047	2,297.42
Aegean	regional dummy	0.191	955.77
East Anatolia	regional dummy	0.057	-3,948.62
Central Anatolia	regional dummy	0.210	-1,461.61
Black Sea**	regional dummy	0.205	-1,292.79
Marmara	regional dummy	0.146	703.31
SE Anatolia	regional dummy	0.100	-1,193.95
Intercept			-202.07

significant at 5 percent level of significance, \*\* significant at 1 percent level of significance  
Source: 2002 QHS and own analysis.

6.24 To examine the impact of the DIS Program on the impact of farmer' welfare, we have run the above model with the dependent variable (gross agricultural income in 2002) for the sub-sample of farmers who actually received DIS. Cash transfer programs such as the DIS are usually associated with income effects that are multiples of the amounts transferred. Ideally the multiplier effect would be estimated using a two-stage model where the first stage represents the household decision to participate in the program and the second stage represents the impact of DIS on income or expenditure. Only the second stage of the model is presented here (i.e. a regression for only those households receiving DIS). The specification is fairly robust and passes the appropriate diagnostic tests. The results indicate that receiving DIS payments has a significant and highly positive effect on agricultural income. One million TL paid in DIS generates approximately 4 million TL in gross agricultural income.

6.25 Given the ratio of gross agricultural value added to gross agricultural value (in national statistics for 2002, equal to 0.6), the net impact of one million TL paid in DIS on agricultural income is roughly 2.5 million TL. The finding of a this two and a half-fold multiplier effect is slightly larger than that found in a study of a similar cash transfer program in Mexico<sup>30</sup>. Since DIS is, in effect, serving to replace a large share of the reduction in credit availability which has occurred as a result of the agricultural reforms, it may be that credit availability is so tight that those without access to DIS are particularly negatively impacted. This is indeed what the difference of magnitude of the coefficient on DIS received is indicating (comparing the results of Tables 6.5 and 6.6).

6.26 Testing of alternative models indicates that the multiplier effect did not rise when the model incorporated interaction terms between participation in DIS and literacy, access to credit, and technical assistance. However, the interaction between DIS and credit and technical assistance was positive and significant indicating that participation in DIS when a household has access to credit and/or technical assistance has a positive multiplier effect on household income.

<sup>30</sup> An analysis of the PROCAMPO cash transfer program in Mexico found a multiplier effect on the order of 2.1 (World Development Vol. 29, No. 6, pp. 10043-1056, "Cash Transfer programs with Income Multipliers: PROCAMPO in Mexico", Elisabeth Sadoulet, Alain de Janvry, and Benjamin Davis.

When the model was run with the gross agricultural income of only the poorest third of households as the dependent variable, the multiplier effect of DIS was not significantly different for the whole sample of DIS recipients. This indicates that there is no significantly differential impact on the poor as opposed to non-poor farming families. However, further examination of this hypothesis using alternative methods is still warranted.