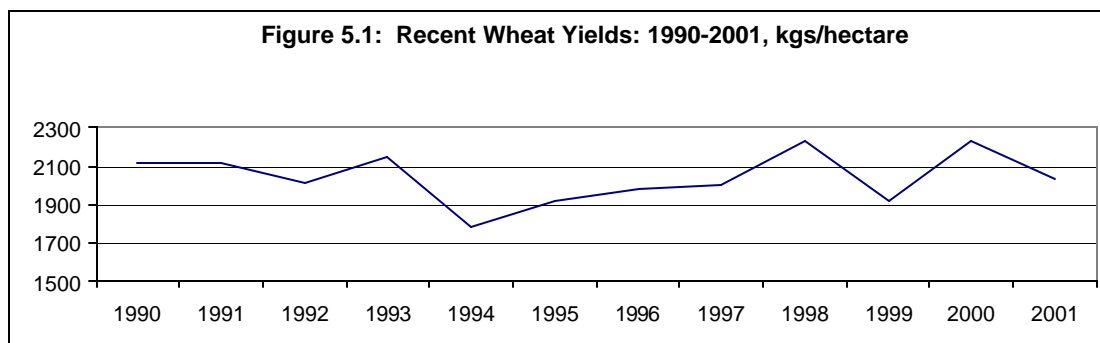


5. National and Regional Dimensions of Agricultural Sector Productivity

5.1 As the DIS payments which started in 2001 are made according to farm size, basic productivity analysis may be helpful in at least two respects. First, the value of gross output per hectare and value added per hectare are useful references for comparison with the magnitude of direct payments aimed at cushioning the impact of reduced subsidies. Second, it is instructive for measuring the ultimate effect of the new policy of decoupling support from the promotion of a more favorable cropping pattern. Though the DIS system is new and only two seasons of direct payments have been made, one can compare the situation before the decoupling (1999) with the situation in 2001 (the most recent year for which all necessary data is available). Thus, this chapter will focus on crop areas and value measures per hectare for the period 1997-2001.

A. Trends at the National Level

5.2 Analysis of productivity usually often focuses on “physical” yields, that is, kilograms of output per hectare. Though the movement of physical yields (for example that of wheat yields provided below in Figure 5.1) embodies the impact of production decisions taken by farmers, it also reflects the impact of weather conditions and technological change in agriculture over the longer run. More importantly, physical yields do not directly show the impact of crop prices, or changes in input prices or technological change in a given year. For this reason, the measures of productivity examined here focus more on land and labor productivity, ie. the values of crop output (in gross and net terms) per hectare or per employed. In this way, the analysis implicitly includes the impact of agricultural producer prices and input prices and allows for more meaningful comparisons across time and crops.



Source: SIS (2001) Agricultural Indicators, Publication No. 2407, Ankara.

5.3 **Agricultural Land.** Total agricultural land used for crop production has decreased by 450,000 ha between 1999 and 2001. The decrease is observed only in some types of land use. The decrease in field crop area (360,000 ha) is responsible for most of the decline, but the area covered by vineyards and olive trees has also decreased. In contrast to the overall trend, the area covered by fruit trees (including nuts) and vegetables is increasing, though only slightly.

Table 5.1: Agricultural Land (1000 hectares)

	Field area	Fallow land	Vegetables	Vineyards	Fruit trees	Olive Trees	Total land
1997	18.605	4.917	775	545	1.364	658	26.864
1998	18.751	4.905	783	541	1.389	600	26.969
1999	18.450	5.039	790	535	1.393	595	26.802
2000	18.207	4.826	793	535	1.418	600	26.379
2001	18.088	4.914	799	525	1.425	600	26.351

Source: SIS.

5.4 An important variable here is “fallow land,” for which there is no disaggregated “fallow land” data by different field crops. Since fallow land may only be considered for field crop totals, individual field crops’ productivity measures exclude the impact of fallow land on yields. In addition, “total land” includes the area for fodder crops, whereas the crop value of hay and straw is not included in the total crop values available (from the “Agricultural Structure” statistics²¹). For these reasons, the productivity of total field crops may be lower than that implied by the productivity of the individual field crops. This also explains the differences the total crop values presented in this chapter as compared with Table 2.3.

5.5 Gross Crop Values Per Hectare fell by 11 percent in real terms. A comparison of the gross crop values across years in current TL is problematic owing to high and varying inflation. Thus, we have chosen here to convert these values into real 2001 TL or US dollars with the annual GDP deflators and Central Bank exchange rates, respectively. The change over time in these two measures can be significantly different. As a result, the real TL values have been chosen as the main basis of comparison across years, and dollar valued are provided in some cases to provide a frame of reference for international comparisons. As can be seen from the first two columns of Table 5.2, the value of crop production has fallen by 11 percent in real TL terms, but 29 percent in US dollar terms.

5.6 The interpretation of the last 2 columns in Table 5.2 reveals a similar divergence. The per hectare gross value of crop production on all agricultural land has fallen by 10 percent in real TL terms, but 28 percent in US dollar terms. The drop in real 2001 TL of 85 million per hectare is actually less than the 100 million TL payment per hectare afforded under the DIS Program in 2001. However, this average loss of gross crop value understates the loss of revenue to farmers and the value added per hectare to farmers, as it does not take into consideration loss rates for output produced nor the higher input costs. These loss rates can be large for some crops, and as was seen in Chapter 2, input costs have risen sharply in 1999-2001. The impact of these factors are examined in the “Net Crop Value” and “Input Costs and Value Added” sections of the chapter below.

5.7 The variation of crop values per hectare by type of crop between 1999 and 2001 (Table 5.3) show a similar pattern as the aggregate results for the crop sub-sectors (Table 5.2). Again, the trends are universally down, except for pulses (up 9 percent). Cereals showed the next best outcome, with a fall of only 4 percent. The highest reduction is for “other field crops (- 22 percent),” which includes tobacco, sugarbeet, oilseeds, and cotton, among other crops. For field

²¹The main source of data for production, price and value are the annual publication of State Institute of Statistics (SIS) “Agricultural Structure (production, price, value).” Production quantities of field crops, fruits and vegetables and prices received by farmers are obtained from this publication.

crops as a whole, the decline was 15 percent. The value of fruits and nuts per hectare declined by 12 percent, while those of vegetables declined by only 2 percent.

Table 5.2: Gross Value of Crop Production (1997-2001)

	Gross Value of Crop Production (Real 2001 trillion TL)	Gross Value of Crop Production (US\$ millions)	Per hectare Gross Value of Crop Production (Real 2001 million TL/ha)	Per hectare Gross Value of Crop Production (US\$/ha)
1997	22,746	23,496	847	875
1998	26,528	27,962	984	1,037
1999	22,620	23,158	844	864
2000	23,171	23,931	878	907
2001	20,017	16,377	759	621

Source: SIS and own calculations.

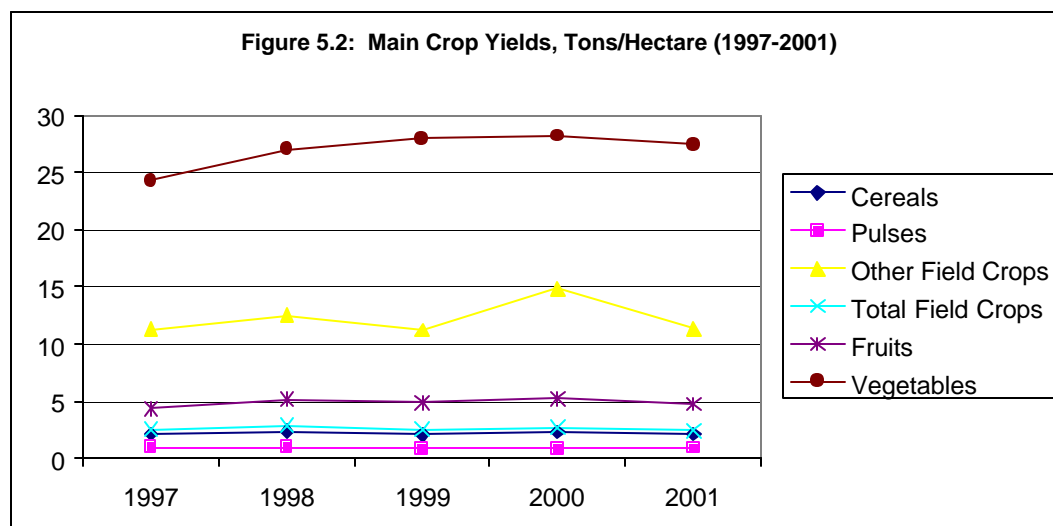
5.8 The DIS payment of 100 million TL per hectare was able to compensate average farmers and average cereal farmers more than fully to replace lost production value on average for field crops and on average for all crops taken together (as seen in the “Total” row). However, within this wide category, this has likely not been the case for farmers specializing in tobacco and sugarbeet. For fruits and nuts this has not been the case, nor has it been for vegetables.

Table 5.3. Gross Crop Values per Hectare by Crop (Real 2001 Million TL/ha)

	1997	1998	1999	2000	2001	Loss or Gain 1999-2001
Cereals	395	408	326	344	315	80
Pulses	422	504	476	528	518	-38
Other Field Crops	2,349	2,361	2,103	2,288	1,637	466
Total Field Crops	524	547	458	445	387	71
Fruits and Nuts	1,980	2,903	2,557	2,825	2,261	296
Vegetables	6,901	7,973	6,844	7,195	6,695	189
Total	847	984	844	878	759	85

Source: SIS and own calculations.

5.9 When examining the reasons behind this large fall in gross crop values per hectare across the range of crops produced in Turkey, the first factor to examine is physical yields. However, despite the variability of individual crop yields in this period (particularly wheat and sugarbeet) overall, the various groups of crops have shown remarkably stable physical yields per hectare over the 1999-2001 period. Physical yields for cereals and pulses actually increased, while those for fruits and vegetables were stable. Thus, clearly agricultural price reductions are the main reason behind the fall in gross crop values. This has been seen in Table 2.2 in Chapter 2 and in the section on Price and Output Decomposition in Chapter 4.



Source: SIS.

5.10 Crops value added per hectare fell by 30% in real terms between 1999 and 2001. Inclusion of input costs into the calculation of productivity is crucial since the gross value added figures are calculated by deducting the input costs from net crop value. Input costs in real 2001 TL are presented below (Table 5.5) in aggregate terms and on a per hectare basis. First, it should be noted that the ratio of input costs to value added in constant prices is an indicator of overall intensity of input usage over time. Calculated in 1987 constant prices for the period 1997-2001, this ratio (ranging 22-24 percent) shows that input intensity was quite stable. This corresponds to the finding in Chapter 2 (Table 2.2) that the quantity index of inputs declined only marginally in 1999-2001. The same ratio at current prices has increased from 30 percent to 49 percent, which confirms the real increase in input prices and inelastic demand for inputs overall.

5.11 Since input costs have risen by 13 percent while the gross value of agricultural production has declined, gross value added has declined sharply. As Table 5.5 shows, gross value added in the crop sector has declined by 30 percent. On a per hectare basis, the increase has been only slightly less. This measure declined between 1999-2001 by almost 200 million TL per hectare. This was twice the magnitude of the DIS per hectare payment in 2001, and illustrates that even on average the replacement rate of reduced agricultural input and output subsidies is on the order of 50%. For farmers specializing in crops which saw the greatest declines in subsidies, i.e., sugarbeet, tobacco, and hazelnut, the DIS has replaced even less of the income lost.

Table 5.5: Aggregate Input Costs and Value Added of Crop Production

	Input costs (Real trillion 2001 TL)	Input cost per hectare (Real million 2001 TL/ha)	Gross Value Added (Real trillion 2001 TL)	Million TL/ha (constant 2001 prices)
1997	5,433	202	18,176	677
1998	4,955	184	23,486	871
1999	5,593	209	18,302	683
2000	5,948	225	17,488	663
2001	6,299	239	12,771	485

Source: SIS and own calculations.

B. Regional Variations in Agricultural Sector Productivity

5.12 Changes in Regional Crop Areas. As indicated earlier the major trend in the reform period is a reduction in the overall cultivated area, which decreased from 1999 to 2001 by about 450,000 hectares (1.7 percent). The decline in cultivated area in fact is the continuation of a longer term trend. However, the directions of change are not uniform in all regions. Table 5.6 presents these developments.

Table 5.6: Changes in Cultivated Area by Region (Hectares)

1999	TOTAL	Area sown	Fallow	Vegetables	Fruits
Marmara	2.637.724	2.088.949	77.238	156.914	314.623
Black Sea	3.150.570	2.074.248	394.672	98.812	582.838
Central A.	9.244.476	5.779.257	3.127.729	117.131	220.359
Southeast	3.447.229	2.720.129	252.560	77.696	396.844
East Anatolia	2.613.099	1.783.699	695.516	24.964	108.920
Aegean	3.025.656	1.993.070	260.041	152.312	620.233
Mediterranean	2.682.428	2.010.330	231.386	161.873	278.839
TURKEY	26.801.182	18.449.682	5.039.142	789.702	2.522.656
2001	TOTAL	Area sown	Fallow	Vegetables	Fruits
Marmara	2.594.223	2.041.026	77.104	156.650	319.443
Black Sea	3.106.731	2.024.519	376.867	105.750	599.595
Central A.	8.930.662	5.622.736	2.976.070	115.987	215.869
Southeast	3.422.220	2.696.958	258.676	82.730	383.856
East Anatolia	2.593.217	1.776.541	680.657	26.836	109.183
Aegean	3.014.642	1.955.938	273.235	154.723	630.746
Mediterranean	2.688.780	1.969.826	271.025	156.168	291.761
TURKEY	26.350.475	18.087.544	4.913.634	798.844	2.550.453
2001-1999	TOTAL	Area sown	Fallow	Vegetables	Fruits
Marmara	-43.501	-47.923	-134	-264	4.820
Black Sea	-43.839	-49.729	-17.805	6.938	16.757
Central A.	-313.814	-156.521	-151.659	-1.144	-4.490
Southeast	-25.009	-23.171	6.116	5.034	-12.988
East Anatolia	-19.882	-7.158	-14.859	1.872	263
Aegean	-11.014	-37.132	13.194	2.411	10.513
Mediterranean	6.352	-40.504	39.639	-5.705	12.922
TURKEY	-450.707	-362.138	-125.508	9.142	27.797

Source: SIS and own calculations.

5.13 Total cultivated area has declined in all regions, except the Mediterranean (where the increase was only 0.2 percent). The declines have ranged from 3.5 percent in the Central Anatolia region to 0.3 percent in the Aegean region. Area sown (field crops) has declined in all regions without exception. The largest decline in sown area was in Central Anatolia followed by the Black Sea region and Marmara region. Fallow land has increased (i.e., land which went out of production entirely) in the Mediterranean, East Anatolia, Southeast Anatolia, Black Sea and Marmara regions. Vegetable cultivated area has increased in all areas except in the Marmara and the Mediterranean regions, but this increase has been small, only 1.1 percent in all regions combined. Fruit area has also increased by 1.1 percent nationally, but declined in the Southeast and Central Anatolia regions.

5.14 The most significant decrease in area has happened in Central Anatolia, where sown area to field crops (mainly grains) has fallen by over 150,000 hectares (2.8 percent). The next largest reduction was also in Central Anatolia, again almost 150,000 hectares, and came in fallow land (by 5 percent). The next largest decreases are observed in the Marmara and Black Sea regions. The largest part of these decreases are in area sown (down by 2.5 percent in each case), yet in both regions there is a significant increase in area under fruit trees (by 1.5 and 2.8 percent respectively). The declines in total cultivated area in the Southeast, East Anatolia and Aegean regions have all been less than 1 percent in each case. The increase in total cultivated area in the Mediterranean region has been mainly in fruit production (by 4.5 percent).

5.15 Changes in Regional Gross Crop Values - Largest Absolute Declines in Marmara, Aegean, and Black Sea, but Largest Relative Declines in Central Anatolia. When examining per hectare gross crop values by region, all provinces and regions should be compared to Turkey averages for the years 1999 and 2001. These overall reference magnitudes are repeated from Table 5.3 in Table 5.7 below. (Net crop values and value added per crop type by region cannot be calculated with accuracy as the crop loss parameters, transportation costs, and input costs were not available for the provincial nor regional levels.) Each province may also be compared to its regional averages. (These results are reserved for presentation in the detailed tables in the Statistical Annex to this Review.)

5.16 The gross crop value measure of productivity (in real 2001 TL per hectare) has decreased in all regions except the Southeast from 1999 to 2001. As discussed before this measure understates the loss in value added, and Tables 5.3 and 5.5 showed that the loss in value added was on average more than twice the loss in gross value per hectare nationally. The main findings of the regional examination are that Central Anatolia experienced smaller absolute but larger relative declines in land productivity compared to the more commercial provinces (Aegean, Black Sea, Marmara) which had the highest gross values per hectare in 1999 and have seen the greatest losses in the reform period. These commercial regions are also those which show the lowest elasticity of demand for inputs (as seen in Chapter 3) and therefore have likely experienced the greatest losses in value added per hectare. The exception to this characterization is the Mediterranean province (the most productive province), which witnessed one of the smallest relative drops in land productivity, as compared to its base year 1999 levels.

5.17 These results differ from the findings in Chapter 2, where the largest declines in regional crop PSEs (see Table 2.6) were in Central Anatolia and Eastern Anatolia. This result is understandable for Central Anatolia, as the fall in the aggregate PSE was partly due to the large decline in cereals area. On a per hectare basis, Central Anatolia has suffered a lower loss, but still above the national average. The same pattern is evident in Eastern Anatolia, and the decline in gross crop value per hectare there is well below the national average. (Here crop productivities were at very low levels to start, as these areas are comparatively extensively cultivated.) In the Black Sea region, the overall drop in gross crop values is similar to the fall in the region's crop PSE: in both cases they are in the middle of the range of declines.

Table 5.7: Gross Crop Values by Crop Type and Region (Real 2001 million TL//ha)

2001	Total	Field crops	Vegetables	Fruits
Aegean	1,178	585	7,146	1,810
Black Sea	917	428	6,036	1,968
Central Anatolia	370	247	4,749	2,934
East Anatolia	365	220	5,102	2,478
Marmara	1,118	548	6,504	2,269
Mediterranean	1,545	573	9,200	3,805
Southeast Asia	675	495	5,571	997
TURKEY	759	387	6,695	2,261

1999	Total	Field crops	Vegetables	Fruits
Aegean	1,364	764	6,896	2,180
Black Sea	1,068	551	6,275	2,374
Central Anatolia.	479	354	4,763	3,226
East Anatolia	386	253	5,185	2,308
Marmara	1,273	631	7,111	2,781
Mediterranean	1,638	613	9,552	5,279
South East	567	391	4,955	1,023
TURKEY	844	458	6,844	2,557

2001-1999	Total	Field crops	Vegetables	Fruits
Aegean	-185	-178	250	-370
Black Sea	-151	-123	-239	-406
Central Anatolia.	-108	-107	-14	-293
East Anatolia	-20	-33	-83	169
Marmara	-154	-83	-607	-512
Mediterranean	-93	-40	-352	-1,473
South East	108	104	616	-25
TURKEY	-85	-71	-150	-296

Source: SIS and own calculations.

5.18 Examining the regional crop productivity results by crop type reveals the following. The only increases have been in field crops productivity in the Southeast, vegetable productivity in Aegean and the Southeast, and fruits productivity increase in East Anatolia. The largest declines have occurred where productivity was already very high. These have been in the Mediterranean region, where fruit and vegetable gross crop values fell by 1,500 million TL and 350 million TL per hectare, respectively. Still, the Mediterranean region has maintained its leading position in both these sectors, with gross crop values 30 percent above the next most productive regions in both these crops.

5.19 The Marmara region remained at or above Turkey's average gross crop values in all sectors, despite the fact that its gross crop values for all these crops fell by more than the average level of decreases nationally. The Black Sea region also experienced severe strong productivity decreases, with decreases in gross crop values for field crops larger than the average reductions for the country as a whole. The Aegean region has also had much greater productivity decreases compared to the national average declines, except for vegetables. The Central Anatolia region saw slightly less than the average reductions in gross crop values for fruits and much less for vegetables.

5.20 It must also be noted that all provinces within a region are not homogenous with respect to the level of productivity and productivity decreases. There were many provinces that achieved productivity increases in several sectors, especially in fruit production, even under such unfavorable economic conditions. Another distinguishing feature is the difference between coastal and inland province results within the same region.