

## CHAPTER 10

# Shifting Patterns of Agricultural Production and Productivity in the Former Soviet Union and Central and Eastern Europe

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### 1. INTRODUCTION

Economic and institutional reforms have dramatically affected the agricultural performance in all Central and Eastern European countries and Former Soviet Union republics. Not only did agricultural output fall dramatically in the region but also efficiency decreased during the transition, according to some studies.

In a review of the evidence, Rozelle and Swinnen (2004) found that despite the dramatic fall in agricultural output, agricultural productivity in Central Europe and parts of the Balkans and the Baltics started to increase in the early years of transition. Both labor productivity and total factor productivity sharply increased, whereas these productivity measures continued to decline much longer in most countries of the Former Soviet Union. Initial declines in productivity were associated with disruptions due to price liberalization and subsidy cuts (Macours and Swinnen 2000a), land reforms and farm restructur-

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ing (Macours and Swinnen 2000b), poor incentives and soft budget constraints in some countries of the Former Soviet Union (Sedik, Trueblood, and Arnade 1999), and the disruption of the previously vertically coordinated supply chain (Gow and Swinnen 1998).

Increases in both agricultural output and productivity are important for two reasons. First, higher production and productivity are crucial to meet the growing demand for food and nonfood agricultural products in both domestic and foreign markets (Coelli and Rao 2003). Second, an increase in output and productivity drives up agricultural incomes and improves the competitiveness of the sector (McMillan, Whalley, and Zhu 1989). In regions, such as the Former Soviet Union and some of the less economically advanced Central and Eastern European countries, where a considerable proportion of the rural population still depends on agriculture as its primary source of income, an increase in competitiveness is crucial to enhance the viability of the rural areas and reduce the poverty gap between urban and rural populations.

In this chapter we first analyze the evolution of agricultural output in the different Central and Eastern European countries and Former Soviet Union republics over the past two decades (Section 2).<sup>1</sup> Then we consider changes in input use (Section 3) and, by combining the information on changes in output and input use, we discuss the evolution of agricultural productivity in Section 4. In Section 5, we discuss the reform policies that caused the changes in agricultural output and productivity. Finally, in Section 6, we offer conclusions and draw some lessons on the links between policy and performance.

## 2. CHANGES IN AGRICULTURAL OUTPUT

The evolution of agricultural output is similar in all countries (Figure 10.1). In general, we observe an initial decline in agricultural output and a recovery later on. However, the magnitude of the decline and the length of time until

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<sup>1</sup>To analyze the evolution of output and productivity, we classify the Central and Eastern European countries and the Former Soviet Union republics into six regions: Central and Eastern Europe consists of Central Europe and the Balkan countries, whereas the Former Soviet Union republics consist of the Baltic states, the European Commonwealth of Independent States (CIS), Transcaucasia, and Central Asia. Table 10.1 gives an overview of the classification of the different countries within the regions. Additionally, we refer to and compare input use, output, and productivity (changes) in four periods: the pre-reform period, early transition (year 1-5, roughly the first half of the 1990s), mid-transition (year 6-10, the second half of the 1990s), and the recent period (after 1999). In Central Europe and the Balkan countries, the start of the reforms is assumed to be the year 1989, while in the Baltic states, European CIS, Transcaucasia, and Central Asia the start is assumed to be 1990.

Table 10.1. Classification of the Central and Eastern European countries and the Former Soviet Union republics in different regions

Central Europe	Czech Republic Hungary Poland Slovakia	Transcaucasia	Armenia Azerbaijan Georgia
Balkans	Albania Bulgaria Romania Slovenia	Central Asia	Kazakhstan Kyrgyzstan Tajikistan Turkmenistan Uzbekistan
Baltics	Estonia Latvia Lithuania		
European CIS	Belarus Russia Ukraine		

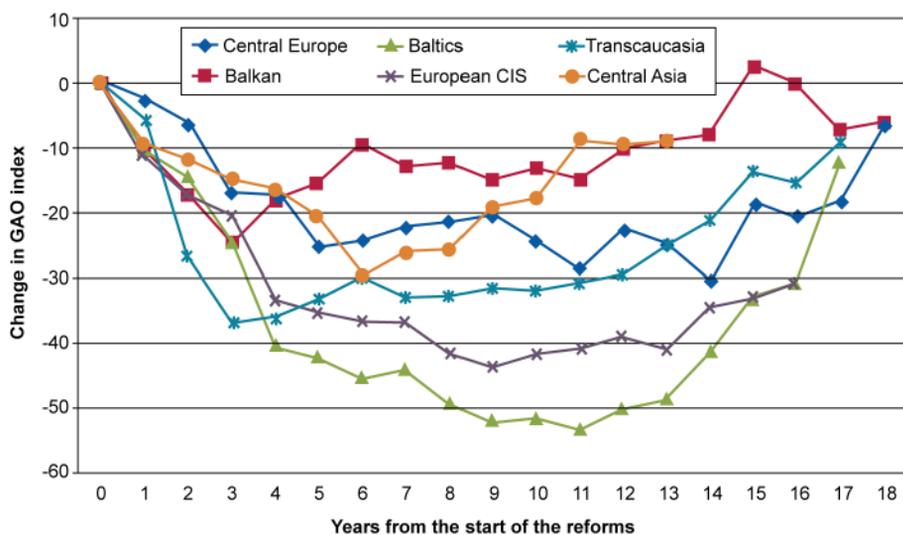


Figure 10.1. Evolution of gross agricultural output (GAO)

Sources: FAO (2008), Asian Development Bank (2008), Eurostat (2008).

Note: Reforms started in 1989 (=year 0) in Central Europe and the Balkan countries and in 1990 (=year 0) in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

recovery differed significantly among regions and even among countries within regions (Table 10.2).

In the early transition period, gross agricultural output decreased in all regions by at least 20%. The transition from a centrally planned economy to a market-orientated economy coincided in all countries with subsidy cuts and price liberalization, which in general caused input prices to increase and output prices to decrease. Purchased inputs were no longer affordable at the new relative prices, and the decrease in input use caused a decrease in agricultural output. In the Baltic states and the European CIS, output decreased to about 50% to 60% of the pre-reform output. In Central Europe and Central Asia, output declined by 25% to 30%. Output stabilized in the mid-1990s in Central Europe and later also in the other regions. Currently, agricultural output is close to the pre-reform output level in most countries.

### 3. CHANGES IN INPUT USE

Changes in output and especially productivity are partly caused by changes in input use. Therefore we discuss in this section changes in the most important inputs, namely, labor, land, and capital.

#### 3.1. Labor Use

In the Communist system, labor was inefficiently employed in most sectors of the economy, and several studies suggest that this was especially the case in agriculture (Brada 1989; Bofinger 1993; Jackman 1994). Consequently, the shift to a more efficient allocation of labor in the economy was expected to coincide with a re-allocation of agricultural labor and, more specifically, an outflow of labor from agriculture to other sectors.

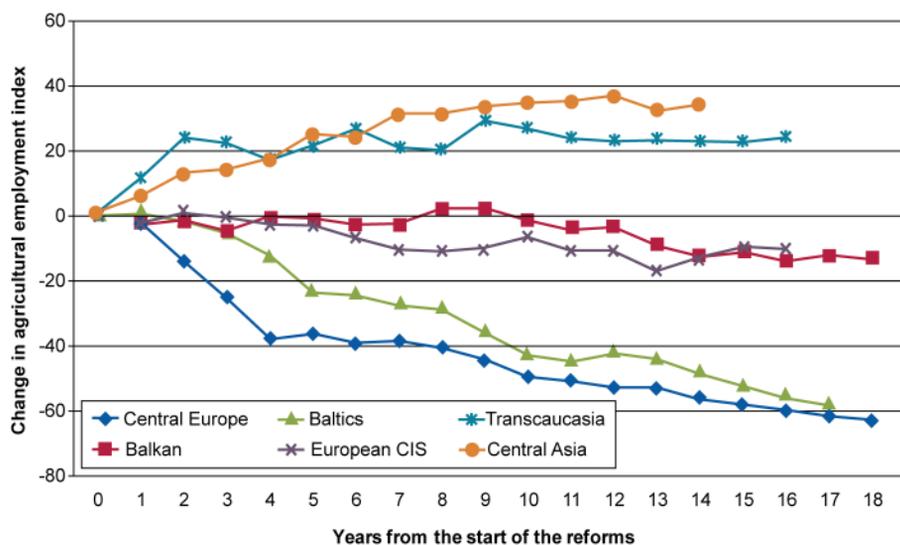
This prediction did not totally coincide with the reality. In some regions, agricultural employment indeed dramatically declined in the early transition period (Figure 10.2). In Central Europe and the Baltic states, agricultural employment declined, respectively, by 40% and 20%. However, in other regions, such as the Balkan countries and the European CIS, agricultural employment was relatively stable, and it even increased in Transcaucasia and Central Asia. In these regions, agriculture is said to have provided a buffer role during transition, both in terms of labor allocation and in terms of food security (Seeth et al. 1998). By the end of the mid-transition period, agricultural employment in Transcaucasia had increased on average by almost 30% compared to the pre-reform period.

Table 10.2. Growth in gross agricultural output (GOA) (Index=100 in first year of reforms)

	GAO Index			Average Annual Growth Rate (% per year)		
	After 5 Years	After 10 Years	After 15 Years	Year 0-5	Year 5-10	Year 10-15
<b>Central Europe</b>						
Czech Republic	75	77	70	-5.0	0.5	-1.6
Hungary	70	73	82	-6.4	0.8	3.2
Poland	77	85	97	-4.9	2.2	3.2
Slovakia	77	68	76	-5.0	-2.3	3.0
<b>Balkans</b>						
Albania	100	113	133	0.7	2.9	3.2
Bulgaria	63	62	64	-8.4	0.1	1.2
Romania	93	93	116	-0.1	0.4	5.4
Slovenia	81	79	97	-3.0	-0.4	4.3
<b>Baltics</b>						
Estonia	55	42	58	-10.1	-5.1	6.8
Latvia	50	38	55	-12.4	-4.5	7.7
Lithuania	69	65	89	-6.8	-1.0	6.8
<b>European CIS</b>						
Belarus	61	58	71	-8.8	-1.2	4.5
Russia	64	62	70	-8.5	-0.3	2.5
Ukraine	69	55	58	-7.1	-4.0	1.5
<b>Transcaucasia</b>						
Armenia	82	80	100	-3.3	-0.3	4.8
Azerbaijan	55	72	94	-10.9	5.7	5.4
Georgia	62	51	66	-8.2	-3.4	6.0
<b>Central Asia</b>						
Kazakhstan	53	52	55	-10.5	1.1	1.2
Kyrgyzstan	79	110	109	-4.6	6.9	-0.1
Tajikistan	61	53	n.a.	-9.0	-2.6	2.0
Turkmenistan	106	99	151	1.4	0.8	9.6
Uzbekistan	98	97	125	-0.3	-0.2	5.4

Source: FAO 2008.

Note: Reforms started in 1989 in Central Europe and the Balkan countries and in 1990 in the Baltic states, the European CIS, Transcaucasia, and Central Asia.



**Figure 10.2. Evolution of agricultural employment**

Sources: Asian Development Bank 2008, Eurostat 2008, ILO 2008.

Note: Reforms started in 1989 (=year 0) in Central Europe and the Balkan countries and in 1990 (=year 0) in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

Also among countries, agricultural employment evolved differently (Table 10.3). In the Czech Republic and Slovakia, agricultural employment declined in the early transition period on average by, respectively, 11% per year and 6% per year, whereas in Poland the decline was only 2% per year in the same period.

A similar pattern to that of Poland is found in some Balkan countries, such as Romania and Bulgaria. In these countries, agricultural employment initially increased, as rural labor was absorbed by the agricultural sector. However, from 2000 on, the reduction of the agricultural labor force became a constant element in all countries in Central Europe, the Balkans, and the Baltic states.

In the European CIS, Transcaucasia, and Central Asia, the pattern is rather mixed. In Belarus, Georgia, and Kazakhstan, agricultural employment started to decline immediately after the start of the reforms and continued to decline in the mid-transition and recent periods. In most other countries in Transcaucasia, Central Asia, and the European CIS, the agricultural sector absorbed surplus labor in the early transition period, but unlike in Poland and the Balkan countries, there is no strong decrease in agricultural employment observed in the mid-transition period. In some countries in Central Asia, such as Kyrgyzstan, Tajikistan, and Turkmenistan, agricultural employment increased even further in

Table 10.3. Growth in agricultural employment (Index=100 in first year of reforms)

	Labor Use Index			Average Annual Growth Rate (% per year)		
	After 5 Years	After 10 Years	After 15 Years	Year 0-5	Year 5-10	Year 10-15
<b>Central Europe</b>						
Czech Republic	54	39	32	-11.10	-6.27	-3.90
Hungary	43	35	27	-15.26	-3.68	-5.33
Poland	89	83	77	-2.19	-1.30	-1.40
Slovakia	71	47	33	-6.22	-7.74	-6.81
<b>Balkan</b>						
Albania	92	92	93	-0.83	-0.09	0.21
Bulgaria	92	95	96	-1.45	0.72	0.24
Romania	118	115	78	3.44	-0.39	-7.27
Slovenia	95	93	89	-0.77	0.19	-0.22
<b>Baltics</b>						
Estonia	40	27	21	-16.37	-6.99	-5.00
Latvia	79	56	51	-4.47	-6.20	-1.63
Lithuania	113	89	70	2.59	-4.55	-4.26
<b>European CIS</b>						
Belarus	86	67	54	-2.99	-4.68	-4.19
Russia	100	113	92	0.08	2.75	-3.80
Ukraine	106	100	123	1.33	-1.10	4.43
<b>Transcaucasia</b>						
Armenia	194	179	174	14.96	-1.44	-0.62
Azerbaijan	97	137	136	-0.38	8.11	-0.07
Georgia	74	65	58	-5.76	-2.72	-1.96
<b>Central Asia</b>						
Kazakhstan	89	n.a.	n.a.	-2.24	n.a.	n.a.
Kyrgyzstan	135	164	140	6.36	4.06	-2.99
Tajikistan	131	134	155	5.65	0.66	2.92
Turkmenistan	121	140	157 <sup>a</sup>	3.92	2.96	2.88
Uzbekistan	112	99	91	2.35	-2.33	-1.70

Sources: Asian Development Bank 2008, Eurostat 2008, and ILO 2008.

Note: Reforms started in 1989 in Central Europe and the Balkan countries and in 1990 in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

<sup>a</sup>After 14 years of reform.

the mid-transition period. In the recent period, agricultural employment started to decrease in most countries in Transcaucasia, Central Asia, and the European CIS. However, in some countries, such as Tajikistan and Turkmenistan, agricultural employment is still increasing.

### **3.2. Land Use**

The evolution of land use was different among regions (Table 10.4). In Central Europe, the Balkan countries, the Baltic states, and the European CIS, agricultural land use was relatively stable in the early transition period. In the same period, land use in Transcaucasia and Central Asia decreased by, respectively, 6% and 10%. After this decrease, agricultural land use stabilized, and in Transcaucasia agricultural land use recently reached the pre-reform land-use level.

### **3.3. Capital Use**

The most dramatic changes in input use in the first years after transition were changes in capital use. In this section we discuss changes in tractor and fertilizer use.

The evolution of tractor use in the different countries is shown in Table 10.5. In the early transition period, tractor use in Central Europe declined by 17%, and in the Balkan countries the decline was even larger, namely, 24% compared to the pre-reform level. In the subsequent periods tractor use stabilized, and in some countries it even increased. In the European CIS, Transcaucasia, and Central Asia, tractor use initially declined less compared to use in Central Europe and the Balkan countries. However, in the subsequent years, the decline in tractor use accelerated, and, for example, after 15 years of transition, tractor use in the European CIS reached only 50% of the pre-reform level.

Fertilizer use declined even more dramatically than tractor use, although the pattern of decline in the different regions is similar (Table 10.6). In Central Europe and the Baltic states, fertilizer use declined in the early transition period by almost 80%, and in the Balkan countries, it declined by 65%. In the European CIS, Transcaucasia, and Central Asia, fertilizer use also declined in the first four years of transition, but in the succeeding years the decline accelerated, and by 2002 fertilizer use fell to approximately 20% of pre-reform fertilizer use. In some countries, such as Kazakhstan, Armenia, or Russia, it declined to less than 10% of pre-reform fertilizer use.

Table 10.4. Growth in land use (Index=100 in first year of reforms)

	Land Use Index			Average Annual Growth Rate (% per year)		
	After 5 Years	After 10 Years	After 15 Years	Year 0-5	Year 5-10	Year 10-15
<b>Central Europe</b>						
Czech Republic	103	103	103	0.67	0.03	-0.08
Hungary	94	95	90	-1.12	0.21	-1.04
Poland	99	98	87	-0.12	-0.29	-2.34
Slovakia	100	100	86	-0.03	-0.02	-2.74
<b>Balkan</b>						
Albania	101	103	101	0.29	0.34	-0.40
Bulgaria	100	105	110	0.05	0.98	0.93
Romania	100	100	96	0.05	-0.02	-0.88
Slovenia	91	83	82	-1.84	-1.82	-0.29
<b>Baltics</b>						
Estonia	107	107	90	1.49	-0.07	-2.27
Latvia	99	97	106	-0.18	-0.45	1.77
Lithuania	100	100	111	0.01	-0.11	2.25
<b>European CIS</b>						
Belarus	98	97	93	-0.48	-0.19	-0.88
Russia	98	99	98	-0.34	0.07	-0.14
Ukraine	100	99	98	-0.08	-0.21	-0.05
<b>Transcaucasia</b>						
Armenia	102	108	116	-2.90	1.17	1.45
Azerbaijan	96	103	106	-0.73	1.39	0.63
Georgia	86	85	71	-0.14	-0.31	-3.22
<b>Central Asia</b>						
Kazakhstan	96	93	93	-2.90	-0.70	0.10
Kyrgyzstan	99	102	102	-0.73	0.46	0.09
Tajikistan	97	94	94	-0.14	-0.67	-0.11
Turkmenistan	73	74	75	-0.52	0.14	0.26
Uzbekistan	89	89	87	-5.78	-0.01	-0.34

Source: FAO 2008

Note: Reforms started in 1989 in Central Europe and the Balkan countries and in 1990 in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

Table 10.5. Growth in tractor use (Index=100 in first year of reforms)

	Tractor Use Index			Average Annual Growth Rate (% per year)		
	After 5 Years	After 10 Years	After 15 Years	Year 0-5	Year 5-10	Year 10-15
<b>Central Europe</b>						
Czech Republic	58	71	80	-6.34	-2.02	-1.96
Hungary	72	72	86	2.75	0.03	-0.51
Poland	114	113	118	-2.22	-0.26	1.12
Slovakia	89	65	60	-5.26	-3.65	-1.52
<b>Balkan</b>						
Albania	74	67	62	-6.86	-2.05	-1.67
Bulgaria	69	75	58	1.55	1.65	-2.13
Romania	106	108	113	-9.97	0.08	1.80
Slovenia	56	72	69	1.13	5.8	-1.66
<b>Baltics</b>						
Estonia	106	108	119	-3.77	0.11	0.02
Latvia	82	91	91	3.48	-2.84	0.21
Lithuania	118	138	169	-1.58	2.83	5.31
<b>European CIS</b>						
Belarus	92	58	44 <sup>a</sup>	-3.94	-7.97	-29.66
Russia	82	58	37	-1.68	-6.21	-8.93
Ukraine	92	62	69	3.62	-7.82	-3.93
<b>Transcaucasia</b>						
Armenia	119	117	128	-1.92	0.27	0.22
Azerbaijan	90	91	52	-6.54	-1.08	-10.70
Georgia	71	73	64	-4.64	4.00	-1.48
<b>Central Asia</b>						
Kazakhstan	78	23	21	-0.04	-22.19	-2.96
Kyrgyzstan	99	102	88 <sup>b</sup>	-3.21	6.93	-3.71
Tajikistan	84	65	59	-4.21	-5.13	-0.42
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Source: FAO 2008.

Note: Reforms started in 1989 in Central Europe and the Balkan countries and in 1990 in the Baltic states, the European CIS, Transcaucasia and Central Asia.

<sup>a</sup>After 14 years of reform.

<sup>b</sup>After 13 years of reform.

Table 10.6. Growth in fertilizer use (Index=100 in first year of reforms)

	Fertilizer Use Index			Average Annual Growth Rate (% per year)		
	After 4 Years	After 8 Years	After 12 Years	Year 0-4	Year 4-8	Year 8-12
<b>Central Europe</b>						
Czech Republic	27	27	35	-26.6	1.0	6.9
Hungary	13	20	21	-36.3	12.9	2.2
Poland	33	42	39	-21.7	6.4	-1.8
Slovakia	16	18	20	-33.7	3.4	4.5
<b>Balkan</b>						
Albania	25	7	23	-21.6	-27.9	99.9
Bulgaria	26	22	22	-27.1	2.7	3.2
Romania	29	23	27	-22.7	-4.9	7.5
Slovenia	61	49	48	-11.5	-4.6	-0.5
<b>Baltics</b>						
Estonia	27	20	16	n.a.	-3.8	-2.9
Latvia	21	48	48	-29.0	23.6	2.4
Lithuania	16	12	17	-32.6	-4.5	8.8
<b>European CIS</b>						
Belarus	34	44	35	-21.5	9.7	-5.0
Russia	30	8	9	-24.4	-23.1	4.2
Ukraine	29	14	16	-24.7	-14.5	4.7
<b>Transcaucasia</b>						
Armenia	23	15	17	-30.4	-4.7	18.7
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	39	24	20	-20.1	-8.0	-2.3
<b>Central Asia</b>						
Kazakhstan	42	2	11	-18.9	-39.7	59.1
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	32	16	12	n.a.	-16.2	19.8
Turkmenistan	51	23	30	n.a.	-11.4	7.1
Uzbekistan	46	59	52	-17.7	14.8	-3.4

Source: FAO 2008.

Note: Reforms started in 1989 in Central Europe and the Balkan countries and in 1990 in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

#### 4. CHANGES IN AGRICULTURAL PRODUCTIVITY

Total factor productivity (TFP) is often calculated using index number methods described in the growth accounting literature. Typically, these measures account for growth in output by measuring the impact of changes in input quantities. The unexplained residual, which is called TFP, measures changes in total output not accounted for by changes in inputs.

For the agricultural sector in the Central and Eastern European countries and the Former Soviet Union republics, TFP estimates are limited. Macours and Swinnen (2000b) estimated TFP for the Central and Eastern European countries for the period 1989-1995. Swinnen and Vranken (2009) extended this series to 2002. Lerman, Csaki, and Feder (2004) estimated TFP indices for the Former Soviet Union republics. Other studies on a wide variety of countries performed farm-level productivity analyses based on farm survey data (see Gorton and Davidova 2004 for a review).

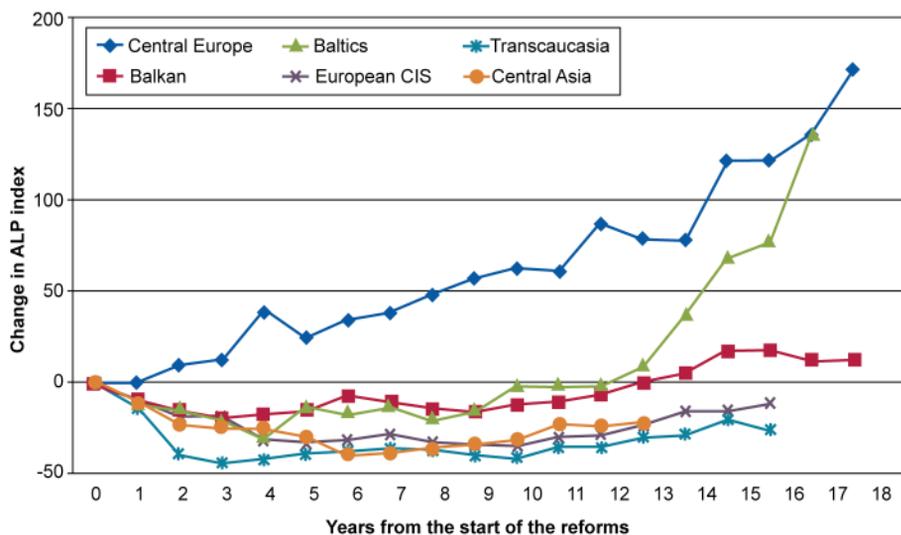
Given the limited TFP estimates, we first discuss partial productivity estimates, such as labor productivity, land productivity, and output per livestock unit. Then we discuss the available TFP studies in the region, and although only limited TFP comparisons can be made between countries and over time, the available evidence on TFP is roughly consistent with the evidence from the partial productivity indicators.

##### 4.1. Partial Factor Productivity

###### 4.1.1. Labor Productivity

A first partial measure of productivity that we consider is agricultural labor productivity (ALP), measured as output per farm worker (Figure 10.3). Despite a decrease in agricultural output in total, output per worker in Central Europe strongly increased during the past two decades. This increase was driven by the dramatic decrease in agricultural employment in the early transition period. As output stabilized at the end of the mid-transition period and agricultural employment continued to decline, the increase in ALP continued.

However, this was not the pattern followed by all countries in Central Europe (Table 10.7). In Poland, the agricultural sector acted as a social buffer and absorbed rural labor in the early transition period (Swinnen, Dries, and Macours 2005). ALP decreased initially, as much labor was absorbed in agriculture. In the mid-transition period, outflow of agricultural labor started, and ALP began to increase.



**Figure 10.3. Evolution of agricultural labor productivity (ALP)**

Sources: FAO 2008, Asian Development Bank 2008, Eurostat 2008, ILO 2008.

Note: Reforms started in 1989 (=year 0) in Central Europe and the Balkan countries and in 1990 (=year 0) in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

A similar pattern to that of Poland is found in some Balkan countries, such as Romania and Bulgaria. Initially, ALP decreased, as rural labor was absorbed by the agricultural sector. However, in the late 1990s, labor began to flow out from agriculture, and this outflow of labor, in combination with increased investments in the farming and agri-food industry, resulted in a gradual but consistent improvement in ALP.

Farther east, ALP strongly decreased in the first decade after transition. On average, ALP decreased by 33% in the European CIS and by 30% in Central Asia in the early transition period. The strong decline in ALP was the result of two effects. First, agricultural output declined strongly in both regions, and second, the outflow of agricultural labor was limited and in some regions agricultural employment even increased. In the mid-transition period, however, the decline in ALP started to slow down, and since the beginning of 2000, ALP has recovered slowly.

#### 4.1.2. Land Productivity

A second partial productivity measure is land productivity or yield. Figure 10.4 gives the evolution of the average yield in the different regions. In all

Table 10.7. Growth in agricultural labor productivity (ALP) (Index=100 in first year of reforms)

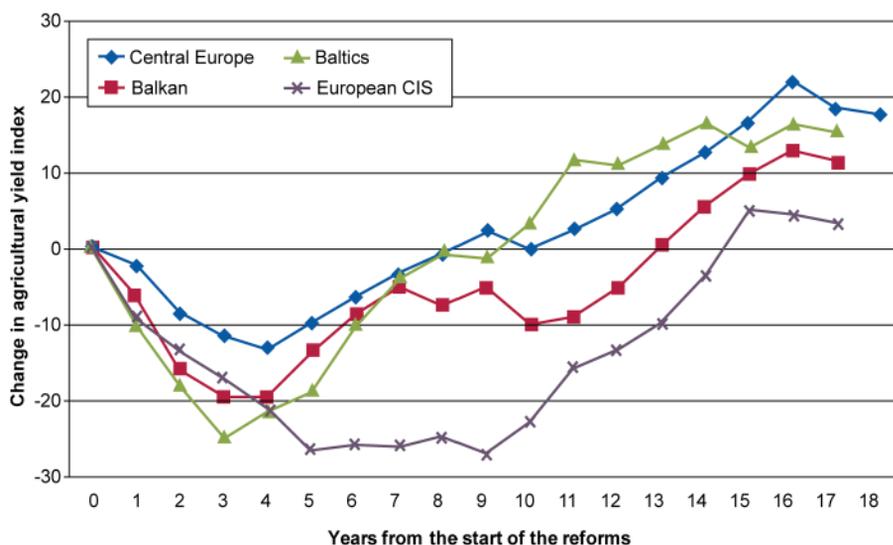
	ALP index			Average Annual Growth Rate (% per year)		
	After 5 Years	After 10 Years	After 15 Years	Year 0-5	Year 5-10	Year 10-15
<b>Central Europe</b>						
Czech Republic	140	198	222	9.06	7.30	2.56
Hungary	164	207	307	10.84	4.78	9.18
Poland	86	102	126	-2.66	3.80	4.67
Slovakia	110	145	230	2.26	5.83	10.88
<b>Balkan</b>						
Albania	108	124	143	3.31	2.89	3.02
Bulgaria	69	64	67	-6.90	-0.53	1.04
Romania	79	81	157	-3.34	1.06	15.55
Slovenia	85	85	110	-1.51	0.55	5.73
<b>Baltics</b>						
Estonia	138	153	274	10.18	2.47	12.96
Latvia	64	68	107	-8.38	2.22	9.97
Lithuania	61	73	126	-8.88	3.87	12.30
<b>European CIS</b>						
Belarus	72	85	132	-5.79	3.75	9.19
Russia	63	55	76	-8.50	-2.45	6.91
Ukraine	65	55	47	-8.34	-2.93	-2.94
<b>Transcaucasia</b>						
Armenia	42	45	57	-14.34	1.25	5.39
Azerbaijan	57	53	69	-9.99	-0.78	5.50
Georgia	84	79	113	-2.60	-0.73	8.10
<b>Central Asia</b>						
Kazakhstan	60	n.a.	n.a.	-8.23	n.a.	n.a.
Kyrgyzstan	58	67	78	-9.98	2.88	3.43
Tajikistan	46	39	40 <sup>a</sup>	n.a.	-2.95	1.01 <sup>a</sup>
Turkmenistan	88	71	84 <sup>b</sup>	-2.40	-2.00	5.42 <sup>b</sup>
Uzbekistan	88	98	138	-2.33	2.31	7.22

Sources: FAO 2008, Asian Development Bank 2008, Eurostat 2008.

Note: Reforms started in 1989 in Central Europe and the Balkan countries and in 1990 in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

<sup>a</sup>After 13 years of reform.

<sup>b</sup>After 14 years of reform.



**Figure 10.4. Evolution of average agricultural yield**

Source: FAO 2008.

Notes: Average yield is the average yield index of milk, grains and sugar beet. Calculations are based on the average of the milk yield, a three-year moving average of the grain yield, and a three-year moving average of the sugar beet yield. Balkan does not include Slovenia. Reforms started in 1989 (=year 0) in Central Europe and the Balkan countries and in 1990 (=year 0) in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

regions, average yield fell in the early transition period and recovered later. However, the depth and the length of the decrease differed strongly among countries. Average yields recovered considerably in the mid-transition period in countries such as Hungary, nations with relatively more large-scale farming and investments in the food industry. In contrast, average yield grew more slowly and more modestly in countries such as Romania, which has a large number of small-scale family farms with difficult access to inputs. Average yield declined the most in the European CIS and Central Asia, where yields started to increase from the beginning of 2000, and only recently have yields reached their pre-reform levels.

The aggregate figures on the evolution of the average yield in the different regions hide important differences among commodities. Therefore, we consider average grain yield and its evolution in the different regions and countries. In addition, we also analyze sugar beet yields in Central Europe, the Balkan countries, the Baltic states, and the European CIS, as well as and cotton yields in Central Asia (Table 10.8 and Table 10.9).

Table 10.8. Average grain, sugar beet, and cotton yields in 2005-2007

	Barley (tons/ha)	Corn (tons/ha)	Wheat (tons/ha)	Sugar Beet (tons/ha)	Cotton (tons/ha)
<b>Central Europe</b>					
Czech Republic	3.87	6.91	4.80	52.68	-
Hungary	3.55	7.03	4.06	50.18	-
Poland	3.02	5.49	3.71	45.56	-
Slovakia	3.41	5.50	3.99	48.84	-
<b>Balkan</b>					
Albania	2.66	4.74	3.26	21.67	-
Bulgaria	2.56	3.77	2.92	17.18	-
Romania	2.07	3.09	2.46	28.31	-
Slovenia	3.75	7.60	4.35	42.56	-
<b>Baltics</b>					
Estonia	2.50	n.a.	3.03	n.a.	-
Latvia	2.29	n.a.	3.32	37.28	-
Lithuania	2.44	3.41	3.34	41.40	-
<b>European CIS</b>					
Belarus	2.87	4.33	3.13	35.98	-
Russia	1.86	3.48	2.00	29.99	-
Ukraine	1.90	3.98	2.57	27.57	-
<b>Central Asia</b>					
Kazakhstan	1.18	4.45	1.13	-	2.22
Kyrgyzstan	1.96	6.06	2.10	-	2.64
Tajikistan	1.60	3.94	2.10	-	1.64
Turkmenistan	1.05	1.07	3.29	-	1.44
Uzbekistan	1.52	5.88	4.30	-	2.53

Source: FAO 2008.

*Change in grain productivity.* In the early transition period, grain yield decreased by more than 20% in all regions (Figure 10.5). After five years, grain yield started to recover in all countries, except in the European CIS, where yield remained for the next decade at approximately 75% of the pre-reform yield.

There are large differences in yields among countries (Table 10.8). Yields of arable crop production are the highest in the Central European countries and the lowest in the European CIS and Central Asia, reflecting differences in productivity and soil quality.

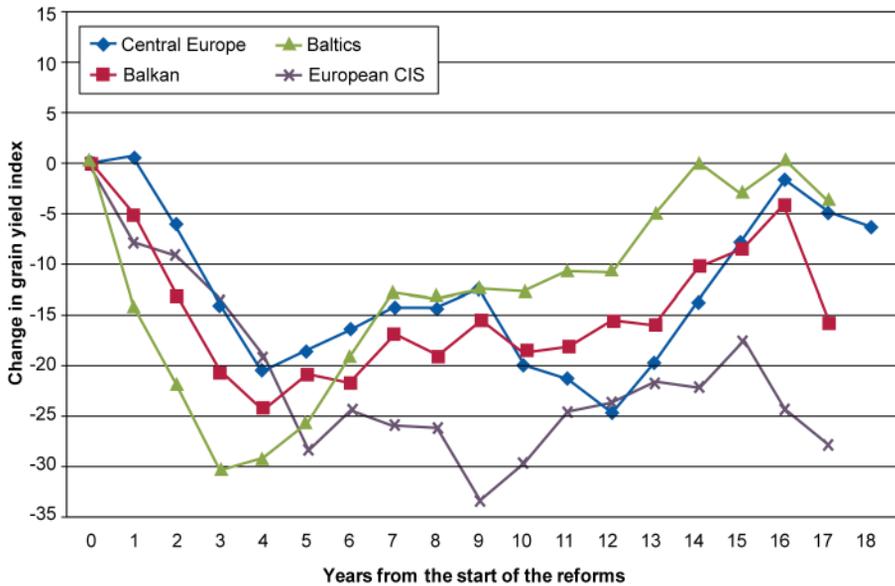
*Changes in yields of sugar beet and cotton.* In Central Europe and the Baltic states, sugar beet yield decreased by 10% and 20%, respectively (Figure 10.6). In the mid-transition period, yield started to gradually increase, and in 2005 sugar

Table 10.9. Growth in land productivity (Index=100 in first year of reforms)

Years after the Reforms	Grain Yield Index			Sugar Beet Yield Index			Cotton Yield Index		
	5	10	15	5	10	15	5	10	15
<b>Central Europe</b>									
Czech Republic	86	85	97	110	126	140	-	-	-
Hungary	69	71	87	67	91	107	-	-	-
Poland	86	89	100	101	109	123	-	-	-
Slovakia	84	75	84	99	103	131	-	-	-
<b>Balkan</b>									
Albania	86	90	104	62	77	78	-	-	-
Bulgaria	62	62	69	55	57	90	-	-	-
Romania	88	92	101	75	70	98	-	-	-
<b>Baltics</b>									
Estonia	75	84	100	89	n.a.	n.a.	-	-	-
Latvia	82	93	102	79	107	126	-	-	-
Lithuania	66	84	89	83	109	130	-	-	-
<b>European CIS</b>									
Belarus	79	68	87	65	84	110	-	-	-
Russia	70	79	95	69	86	131	-	-	-
Ukraine	67	62	73	83	74	110	-	-	-
<b>Central Asia</b>									
Kazakhstan	54	93	76	-	-	-	69	74	83
Kyrgyzstan	63	93	99	-	-	-	74	111	124
Tajikistan	81	101	150	-	-	-	51	57	67
Turkmenistan	76	70	123	-	-	-	72	58	53
Uzbekistan	98	55	228	-	-	-	90	82	95

Source: FAO 2008.

Notes: Calculations are based on a three-year moving average of grain yield, a three-year moving average of sugar beet yield, and a three-year moving average of cotton yield. Reforms started in 1989 in Central Europe and the Balkan countries and in 1990 in the Baltic states, the European CIS, Transcaucasia, and Central Asia.



**Figure 10.5. Evolution of grain yield**

Source: FAO 2008.

Notes: Calculations based on three-year moving average of the grain yield. Balkan does not include Slovenia. Reforms started in 1989 (=year 0) in Central Europe and the Balkan countries and in 1990 (= year 0) in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

beet yield increased by 30% compared to the pre-reform level. In the Balkan countries, sugar beet yield declined by almost 40% in the first years of transition, and also in the mid-transition period yields were substantially below the pre-reform level. Recently, sugar beet yields gradually increased, and in 2005 yield reached the pre-reform level. The evolution of sugar beet yield in the European CIS followed a similar pattern as in the Balkan countries until the beginning of the 2000s. From then on, yield increased very strongly, and by 2005 yield had increased by almost 20% compared to the pre-reform period.

In Central Asia, cotton yield decreased by 30% compared to the pre-reform period, and after a slight increase in the beginning of the 2000s, yield stabilized at 85% of the pre-reform cotton yield.

#### 4.1.3. Output per Livestock Unit

Except for the Balkan countries, milk yield initially declined in all regions (Figure 10.7). Yield reached a minimum for Central Europe and the Baltic states at, respectively, 90% in 1992 and 80% in 1993 of the pre-reform milk yield.

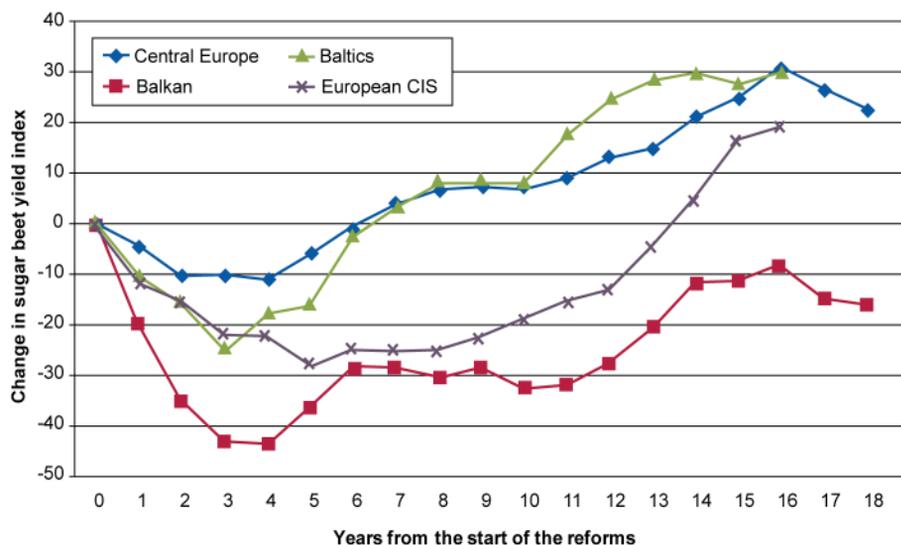


Figure 10.6. Evolution of sugar beet yield

Source: FAO 2008.

Notes: Calculations based on three-year moving average of the sugar beet yield for Central Europe, the Balkan countries, the Baltic states, and the European CIS. Reforms started in 1989 (=year 0) in Central Europe and the Balkan countries and in 1990 (= year 0) in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

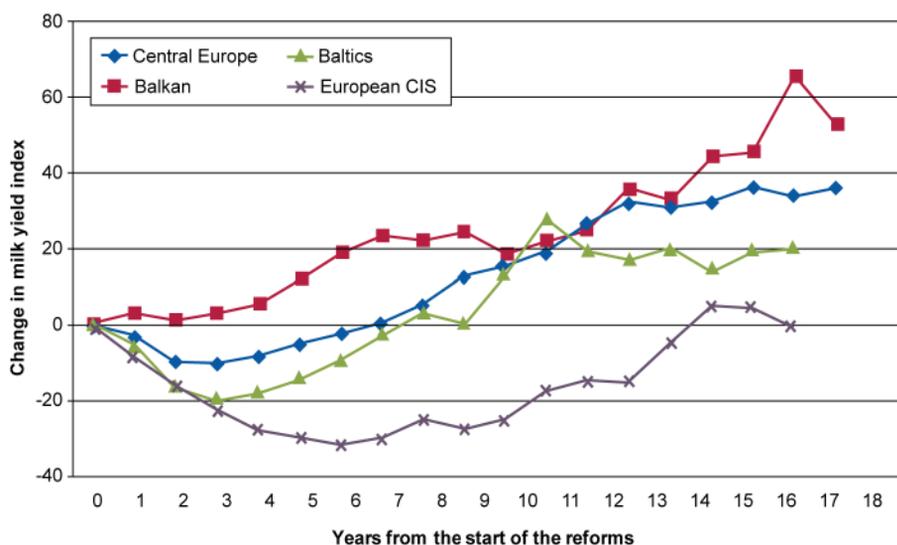


Figure 10.7. Evolution of milk yield

Source: FAO 2008.

Notes: Balkan does not include Slovenia. Reforms started in 1989 (= year 0) in Central Europe and the Balkan countries and in 1990 (= year 0) in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

From then on, milk yield in both regions steadily increased, to 136% and 120% respectively in 2007. Productivity fell farthest in the European CIS and continued to decrease when productivity in all other regions started to recover. In the mid-transition period, milk yield in the European CIS slowly began to recover after it had decreased to less than 68% of the pre-reform milk yield, and in 2005, milk yield reached the pre-reform level.

Milk yield is highest in the Central European and Baltic countries where the average yearly milk yield is between 4 and 7 tons per livestock unit (Table 10.10). In the Balkan and European CIS, milk yield is between 2 and 3 tons per livestock unit per year, whereas in Central Asia milk yield is very low. In Tajikistan, milk yield is below 1 ton per livestock unit per year.

## 4.2. Total Factor Productivity (TFP)

### 4.2.1. Evolution in TFP in Central Europe and the Balkan countries, 1989-2002

Macours and Swinnen (2000b) and Swinnen and Vranken (2009) estimated TFP for the four Central European countries and the four Balkan countries based on crop production (Table 10.11).

**Table 10.10. Output per livestock unit in 2007**

	Milk production (tons/animal/year)		Milk production (tons/animal/year)
<b>Central Europe</b>		<b>European CIS</b>	3.90
Czech Republic	6.72	Belarus	3.50
Hungary	6.88	Russia	3.66
Poland	4.44	Ukraine	
Slovakia	5.81		
		<b>Central Asia</b>	2.20
<b>Balkan</b>		Kazakhstan	2.05
Albania	2.28	Kyrgyzstan	0.72
Bulgaria	3.28	Tajikistan	1.37
Romania	3.39	Turkmenistan	1.70
		Uzbekistan	
<b>Baltics</b>			
Estonia	6.38		
Latvia	4.60		
Lithuania	4.84		

Source: FAO 2008.

**Table 10.11. Growth in TFP in Central Europe and the Balkans (% per year)**

	Average annual change 1989-2001	Average annual change 1989-1992	Average annual change 1992-1995	Average annual change 1995-1998	Average annual change 1998-2001
<b>Overall</b>	1.6	-1.9	4.9	1.4	2.0
<b>Central Europe</b>	2.1	0.4	2.2	4.2	1.7
Czech	1.4	1.3	2.3	3.9	-1.5
Hungary	4.0	1.9	3.4	5.1	5.6
Poland	0.8	-1.7	0.5	3.3	0.9
Slovakia	2.2	0.1	2.4	4.3	2.1
<b>Balkan</b>	1.1	-4.1	7.5	-1.3	2.3
Albania	2.6	-1.1	5.6	2.1	3.9
Bulgaria	-0.4	-1.3	4	-4.1	-0.2
Romania	2.5	-4.2	11.6	-4.8	7.5
Slovenia	-0.4	-9.9	9.0	1.6	-2.2

Source: Swinnen and Vranken 2009.

In Central Europe, TFP grew slightly in the first years of transition—0.4% annually between 1989 and 1992—and significantly afterward—by 2.2% annually between 1992 and 1995 and by 4.4% annually between 1995 and 1998. Studies find a slowdown of TFP growth in the period 1998-2001. The slowdown was probably due to substantial investments in agricultural machinery and capital inputs in this period (Swinnen and Vranken 2009).

In the Balkan countries, the TFP evolution fluctuated much more. TFP decreased strongly, by 4.1% per year, from 1989 to 1992. Later TFP recovered more strongly when it increased by 7.5% per year in the period 1992-1995, but it fell again in the late 1990s, with bad macro-economic policies resulting in TFP declines of 1.3% annually from 1995 to 1998. After 1998 when a series of important reforms were implemented in the region, there was a strong recovery in productivity—from 1998 to 2001, TFP grew on average by 2.3% per year.

The TFP numbers of Albania and Slovenia are remarkable (Swinnen and Vranken 2009). Although Slovenia was one of the richest Balkan countries, its average annual growth rate of TFP was negative for the period 1989-2001. This is in contrast with Albania. Albania was one of the poorest Balkan countries after the fall of the Berlin Wall. However, despite a small decline in TFP in the period 1989-1992, TFP strongly increased beginning in 1992, reflecting successful land reforms and farm restructuring.

#### 4.2.2. Evolution in TFP in the other Former Soviet Union republics

Few TFP estimates have been published for the Former Soviet Union republics. The only study that allows some comparison among all Former Soviet Union republics is by Lerman, Csaki, and Feder (2004) (Table 10.12). They showed that in two Baltic states, Estonia and Lithuania, and two Transcaucasian countries, Armenia and Georgia, TFP strongly increased. In the Central Asian countries, TFP growth was negative.

More work has been done on TFP estimates in Russia and Ukraine; however, the results are less consistent. In these countries, Lerman, Csaki, and Feder (2004) found an increase in TFP during 1992-1997, while partial measures of productivity decreased. In the same period, other studies found a decrease in TFP in both countries (Sedik, Trueblood, and Arnade 1999; Trueblood and Osborne 2001; Kurkalova and Jensen 2003).

### 5. SOURCES OF CHANGES IN OUTPUT AND PRODUCTIVITY

Several studies have tried to explain changes in output and productivity that occurred after the reforms. In general, post-reform changes in output and productivity are related to the choice of the reform instruments (Roland 1997; Aslund,

**Table 10.12. Growth in TFP in the Baltic states, the European CIS, Transcaucasia, and Central Asia (% per year)**

	Average annual change 1992-1997		Average annual change 1992-1997
<b>Overall</b>	<b>0.4</b>		
<b>Baltics</b>	<b>1.7</b>	<b>Central Asia</b>	<b>-2.4</b>
Estonia	2.8	Kazakhstan	-1.0
Latvia	-1.2	Kyrgyzstan	-0.4
Lithuania	3.6	Tajikistan	-2.4
		Turkmenistan	-5.8
<b>European CIS</b>	<b>0.8</b>	Uzbekistan	-2.2
Belarus	0.6		
Russia	1.4		
Ukraine	0.4		
<b>Transcaucasia</b>	<b>3.5</b>		
Armenia	4.6		
Azerbaijan	-0.8		
Georgia	6.6		

Source: Lerman, Csaki, and Feder 2004.

Boone, and Johnson 1996), the pre-reform economic conditions (Sachs and Woo 1994; Woo 1994; Macours and Swinnen 2002), the disruption of previously vertically coordinated supply chains (Blanchard 1997; Gow and Swinnen 1998), the inflow of foreign direct investments in the agri-food industry restructuring (Gow, Streeter, and Swinnen 2000; Dries and Swinnen 2004), and regional tensions and conflict (de Melo and Gelb 1996). Other authors, such as Jackson and Swinnen (1994), also mention the importance of the statistical bias that is caused by over-reporting of the effective output in the pre-reform period and underestimation of the actual output because of limited statistical coverage after the reforms.

In this section we discuss the most important factors that have affected agricultural output and productivity in the past few decades. First, we analyze the role of the initial conditions and the institutional framework. Second, we discuss the role of price liberalization and subsidy cuts. Third, we consider privatization and land reform. Fourth, we analyze the role of farm restructuring. And finally, we analyze a more recent evolution, the inflow of foreign direct investments and the introduction of vertically coordinated supply chains.

### **5.1. Initial Conditions and Institutional Framework**

At the start of the transition, there were substantial differences among regions and even countries in the performance of the overall economy, the importance of the agricultural sector in the overall economy, the technology used in the agricultural sector, and the number of years under central planning (Table 10.13).

The initial conditions affected the transition in two important ways. On the one hand, they affected the impact of reform policies; on the other hand, through institutional and political constraints, they affected the choice of the reform policy. For example, the collectivization of agriculture and the introduction of central planning occurred in the 1920s in the Former Soviet Union but only after World War II in Central Europe and the Balkan countries. Consequently, rural households in Central Europe and the Balkan countries had much more experience with private farming than their counterparts in most of the Former Soviet Union. This difference affected not only the emergence and dynamics of the new private farms but also the preferences for land reforms: in Central Europe and the Balkan households wanted their land back, while in a large part of the Former Soviet Union households had never owned land, since feudalism had directly preceded collectivist farming.

Another condition that played an important role was that in Central Europe and the Baltic states, countries were generally richer and agriculture was less

Table 10.13. Pre-reform indicators

	Share of Agricultural Employment in Total Employment (%)	GNP Per Capita (PPP \$ 1989)	Labor/Land (persons per ha <sup>a</sup> )	Years of Central Planning (number)
<b>Central Europe</b>				
Czech Republic	9.9	8,600	0.122	42
Hungary	17.9	6,810	0.131	42
Poland	26.4	5,150	0.258	41
Slovakia	12.2	7,600	0.139	42
<b>Balkan</b>				
Albania	49.4	1,400	0.627	47
Bulgaria	18.1	5,000	0.132	43
Romania	28.2	3,470	0.204	42
Slovenia	11.8	9,200	0.116	46
<b>Baltics</b>				
Estonia	12.0	8,900	0.072	51
Latvia	15.5	8,590	0.085	51
Lithuania	18.6	6,430	0.098	51
<b>European CIS</b>				
Belarus	19.1	7,010	0.105	72
Moldova	32.5	4,670	0.269	51
Russia	12.9	7,720	0.044	74
Ukraine	19.5	5,680	0.118	74
<b>Transcaucasia</b>				
Armenia	17.4	5,530	0.218	71
Azerbaijan	30.7	4,620	0.203	70
Georgia	25.2	5,590	0.217	70
<b>Central Asia</b>				
Kazakhstan	22.6	5,130	0.008	71
Kyrgyzstan	32.6	3,180	0.054	71
Tajikistan	43.0	3,010	0.185	71
Turkmenistan	41.8	4,230	0.015	71
Uzbekistan	39.2	2,740	0.109	71

Source: Macours and Swinnen 2002.

Note: Pre-reform indicators are for 1989 for the Central and Eastern European countries and for 1990 for the Former Soviet Union republics.

<sup>a</sup>Number of full-time agricultural workers in agriculture.

important in the overall economy, compared to countries in Transcaucasia and Central Asia, which were much poorer with relatively more important agricultural sectors. The general economic situation in a country influenced the extent to which other sectors could absorb surplus labor from agriculture and the development of the social safety net system. Finally, the outflow of surplus agricultural labor was much stronger in Central Europe than in other countries in the 1990s, in part because the social safety net system was much better developed in Central Europe and the agricultural sector was relatively small.

Finally, the resource endowments and technology use affected farm restructuring and the relative efficiency of farm organizations (see Section 5.4).

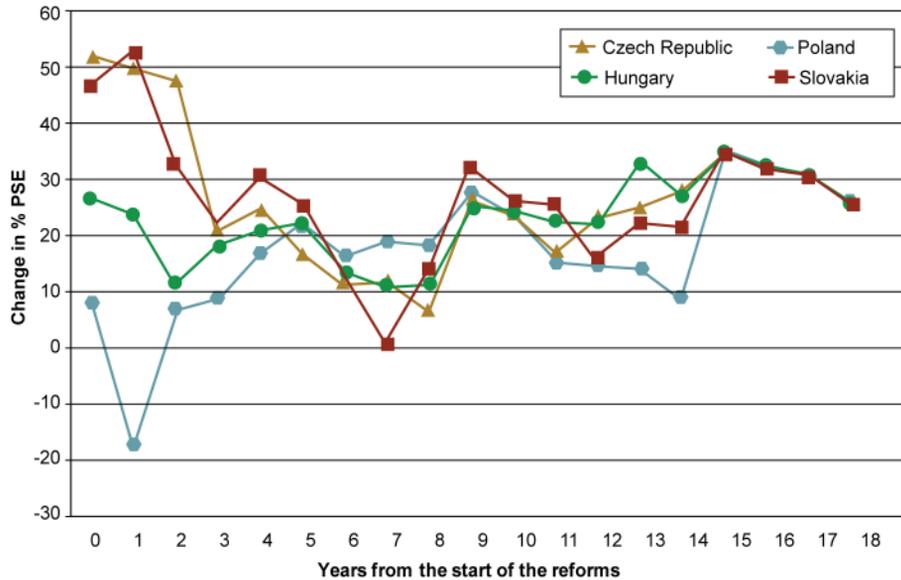
## **5.2. Price Liberalization and Subsidy Cuts**

In all regions, prices of outputs and inputs were determined by the central planning authority. Generally, trade and price liberalizations caused a dramatic fall in the agricultural terms of trade in all regions, because output prices were well above equilibrium prices and input prices were heavily subsidized. This contributed to a fall in input use at the start of the reforms, which caused a decrease in productivity of labor and land (Macours and Swinnen 2000).

However, the implementation of these reforms and thus the effect on productivity differed substantially among regions. Governments in Central Europe and the Baltic states dramatically reduced agricultural subsidies in the early transition period, whereas in some European CIS and countries in Central Asia reforms were more gradual (Hartell and Swinnen 1998; Csaki and Nash 1997; Csaki and Fock 2001). For example, in the early transition period, Russia liberalized its output prices but retained some input support. In other countries, such as Turkmenistan, Uzbekistan, and Belarus, agricultural support remained intact until the end of the 1990s. In Central Europe, economic recovery triggered the demand for the reintroduction of more agricultural support. In most countries agricultural support started to increase at the end of 1990s (Figure 10.8), and more recently these countries have benefited from EU subsidies.<sup>2</sup>

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<sup>2</sup>In all of the Central and Eastern European countries (except Slovenia), the accession to the European Union led to the implementation of a simplified income support scheme, the Single Area Payments Scheme (SAPS). In principle, SAPS consists of a fixed per hectare payment, uniform over all types of land. Although the payments are uniform within one country, they differ substantially among countries. These variations stem from the fact that the rate of per hectare payments is determined based on historical yields (2000-2002) in the different countries. These different yields resulted in substantial differences in the payments per hectare among the Central and Eastern European countries.



**Figure 10.8.** Evolution of producer support estimate (PSE) in Central Europe

Source: OECD 2008.

Notes: Czech Republic, Hungary, Poland, and Slovakia from 2004: %PSE of the EU25-27.

Reforms started in 1989 (=year 0) in Central Europe and the Balkan countries and in 1990 (=year 0) in the Baltic states, the European CIS, Transcaucasia, and Central Asia.

### 5.3. Privatization and Land Reform

A very important element of the reform packages was land reform. Different approaches to land reforms affected the restructuring and structural change in the agricultural sector. In general, three approaches to land reforms were applied: restitution, physical distribution, and distribution of paper shares or certificates (Macours and Swinnen 2002).

First, except for Poland and Albania, land was restituted to the former owners in the Central European countries, the Baltic states, and the Balkan countries. In these countries, where collectivization was imposed only after World War II, land was restituted to the former owners (or their heirs) within the historical boundaries. If restitution was not possible, former land owners (or their heirs) received a plot of comparable size and quality. Second, in Albania, Romania (partly), Armenia, and Georgia, land was physically distributed on an equal basis to agricultural workers or rural households. Third, in the European CIS and Central Asia, paper shares or certificates were distributed equally to collective farm members or state employees. This land reform

process consisted of two steps: first, land ownership rights were transferred from the state to the collective farm, and second, land ownership rights were transferred from the collective farm to the individuals. The land rights were transferred as paper shares or certificates, without any direct link between the individual and a specific plot of land.

In general, the process of privatization and land reform was complicated and slow, which slowed down effective liberalization and prolonged the uncertainty of property rights. As long as property rights were uncertain, markets could not develop, and the decapitalization of the agricultural sector continued through livestock slaughtering and reduced investments (Macours and Swinnen 2000a).

The first and second types of land reform, restitution and the physical distribution, ended up with relatively strong and well-defined property rights. Yet, it was expected that restitution of land would lead to a decrease in productivity, because it entailed fragmentation of agricultural land ownership. However, in many countries restitution contributed to a greater consolidation of land use. Mathijs and Swinnen (1998) explained this using a measure of transaction costs associated with land markets. Restitution of land transferred land rights to the former owners, many of whom were often no longer active in agriculture. These new landowners, except those in poor countries, were not interested in engaging in farming activities. Because the costs of negotiation and search associated with finding new potential renters were too high, the new owners rented out the land to the farm that had been using the land, which was typically the large-scale farmer-cooperative farm. So despite the great fragmentation of property rights, restitution did not lead to more fragmented land use.

In the regions that implemented land reforms by distributing certificates, property rights were less clearly defined, and, at least in the first decade of the reforms, output and productivity were affected as a result. First, restrictions were placed on selling and purchasing shares, and in many countries it was not possible to buy or sell land, which significantly slowed down structural changes and thus productivity growth (Lerman 2001). Second, owners had little incentive to put in effort and undertake investments because property rights on specific plots were not clearly defined (Uzun 2000). Uncertainty on the property rights resulted in a decrease of agricultural output and productivity. However, at the end of the 1990s the situation started to improve when land policies were further liberalized, and limited land transactions became possible, for example, in 2002 in Russia (Rozelle and Swinnen 2004).

#### 5.4. Farm Restructuring

Important productivity gains and losses were associated with farm restructuring. The effects of these gains and losses depended on the initial conditions, such as farm structure and technology used, and the reform policies that were implemented, such as the land reform policies and the general macroeconomic reforms.

The initial conditions, in particular resource endowments and use of technology, affected the relative efficiency of farm organizations and thus incentives for farm restructuring. Resource endowments affect the costs and benefits of shifting from corporate farms to family farms. If labor/land ratios are high, as in countries with labor-intensive technologies, such as in Transcaucasia and the Balkans, the benefits from better labor governance by shifting to family farms from corporate farms are larger, while the losses in scale economies of shifting to smaller farms are lower. These productivity incentives resulted in a strong shift to small-scale farming. In contrast, in more capital- and land-intensive agricultural systems, such as in the Czech Republic and Slovakia, the benefits from shifting to family farms were lower so that large-scale corporate farming remained more important. In these situations, productivity gains came mostly from laying off corporate farm workers. The impact of privatization and farm restructuring also depended on accompanying policy reforms, both in the agricultural sector and in the general economy. First, it depended on the way land reforms were implemented (see section 5.3).<sup>3</sup> Second, it depended on other economic reforms. Labor can flow out from the agricultural sector only if there are sufficient employment alternatives and social security payments. If the unemployment rate is high and unemployment benefits are low, agriculture serves as a social buffer and attracts young, often unmotivated individuals. Low pensions have a similar effect because old people start farming to complement their pensions.

#### 5.5. Foreign Direct Investments in the Agri-Food Industry

An important factor in the decline of both output and productivity was the disruption of vertically coordinated supply chains (Blanchard 1997; Gow and

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<sup>3</sup>In Transcaucasia the shift toward more individual land use was limited in the early years of transition because the privatization process was slow, but later there was an increasing number of small, individual farms. In many countries in the region the share of output from individual farms is much larger than their share in land use, suggesting that the individual farmers are more efficient producers and typically produce more labor-intensive products with a higher value added (Table 10.14).

Table 10.14. Privatization and land reform

	Individual Land Use (%)			Individual Production (%)	
	Pre-reform	After 5 years	After 8/9/10 years	Pre-reform	After 7 years
<b>Central Europe</b>					
Czech Republic	1	19	26	n.a.	n.a.
Hungary	13	22	54	n.a.	n.a.
Poland	76	80	84	n.a.	n.a.
Slovakia	2	5	9	n.a.	n.a.
<b>Balkan</b>					
Albania	3	95	n.a.	n.a.	n.a.
Bulgaria	14	44	56	n.a.	n.a.
Romania	14	71	82	n.a.	n.a.
Slovenia	83	90	94	n.a.	n.a.
<b>Baltics</b>					
Estonia	4	41	63	n.a.	n.a.
Latvia	4	81	87	n.a.	n.a.
Lithuania	9	64	85	n.a.	n.a.
<b>European CIS</b>					
Belarus	7	16	12	25	45
Russia	2	8	13	24	55
Ukraine	6	10	17	27	53
<b>Transcaucasia</b>					
Armenia	7	95	90	35	98
Azerbaijan	2	5	n.a.	35	63
Georgia	12	50	44	48	76
<b>Central Asia</b>					
Kazakhstan	0	5	24	28	38
Kyrgyzstan	4	34	37	34	59
Tajikistan	04	5	9	23	39
Turkmenistan	2	3	8	16	30
Uzbekistan	5	13	14	28	52

Sources: Csaki and Tuck 2000 and Macours and Swinnen 2002.

Swinnen 1998). Investments by private processors and the reintroduction of vertically coordinated supply chains have been important in improving output, productivity, and quality of agricultural products. Foreign direct investment (FDI) in the agri-food sector has played a leading role in these developments through both horizontal and vertical spillover effects on, respectively, domestic processors and farmers.

Prior to the reforms, the entire agri-food chain, from input supplier to consumer, was planned and controlled by a higher central authority. The reform to a market-oriented economy led to the disruption of the agri-food chain, and because of macroeconomic instability and institutional reforms, contract enforcement was no longer guaranteed and all parties in the supply chain were confronted with hold-up problems (Gow and Swinnen 1998; Stiglitz 1993; Hart 1995).

Farmers were not willing to supply to a processor because they feared payment delays or even no payments at all (Gorton, Buckwell, and Davidova 2000; Cungu et al. 2009). If they wanted to supply they often lacked the basic input factors or expertise to produce a certain quantity or quality. Vertical coordination of the supply chain was the solution for processors to guarantee to supply a certain quantity and, later on, also a certain quality.

FDI companies were the first to reintroduce vertically coordinated supply chains through the introduction of an input supply program and farm extension services. In the early stage of transition, processors first wanted to ensure their supplies by introducing input supply and credit programs. In the more advanced stage, they also tried to ensure product quality and offered farmers extension services and training programs. Examples of the first stage can be found in Romania, Bulgaria, and some countries in Central Asia, whereas the second stage is widely seen in the Central European countries. The existence of these different stages indicates that the development of economically more advanced input supply programs is positively correlated with the extent of institutional reform in the countries, because the introduction of these programs requires well-functioning institutions.

Case studies have indicated that there are important horizontal spillovers from these contract innovations on domestic companies that quickly start imitating successful contracting and vertical integration programs introduced by foreign firms (Dries and Swinnen 2004; Gow, Streeter, and Swinnen 2000). Besides horizontal spillovers to other processors, the introduction of the input supply programs also had vertical spillovers to the agricultural producers. The use of input supply programs by agricultural producers who are often credit-constrained led to significant improvements in output, productivity, and quality. A case study of sugar production in Slovakia found that the introduction of farm assistance schemes in the mid-1990s led to an annual increase of sugar beet yields of 9% in the period 1993-1997 (Gow, Streeter, and Swinnen 2000). In a case study on Moldova, Armenia, Georgia, Russia, and Ukraine, White

and Gorton (2004) found that contracting resulted in an annual increase of 3% in productivity and a 4% increase in high-quality output on average over the period 1997-2003.

Empirical evidence on FDI per capita in the different Former Soviet Union republics (Figure 10.9) indicates that in the mid-transition period, FDI strongly increased in Central Europe and the Baltic states. In the Balkan states, the inflow of FDI lagged behind that of Central Europe and the Baltic states. However, after the financial crisis at the end of the 1990s, FDI started to increase. In the most recent years, FDI increased even more strongly in Central Europe and the Balkan countries, suggesting that accession to the European Union has led to a more stable institutional environment, which is necessary to attract FDI. In the European CIS, Transcaucasia, and Central Asia, FDI inflow has been very low, although in the most recent years it increased slightly.

### 6. CONCLUSION

There have been dramatic changes in agricultural productivity over the past two decades in Central and Eastern Europe and the Former Soviet Union. In general, we observe a “J” (or “U”) effect: an initial decline in productivity and a recovery later on. However, the depth of the decline, the time until recovery, and

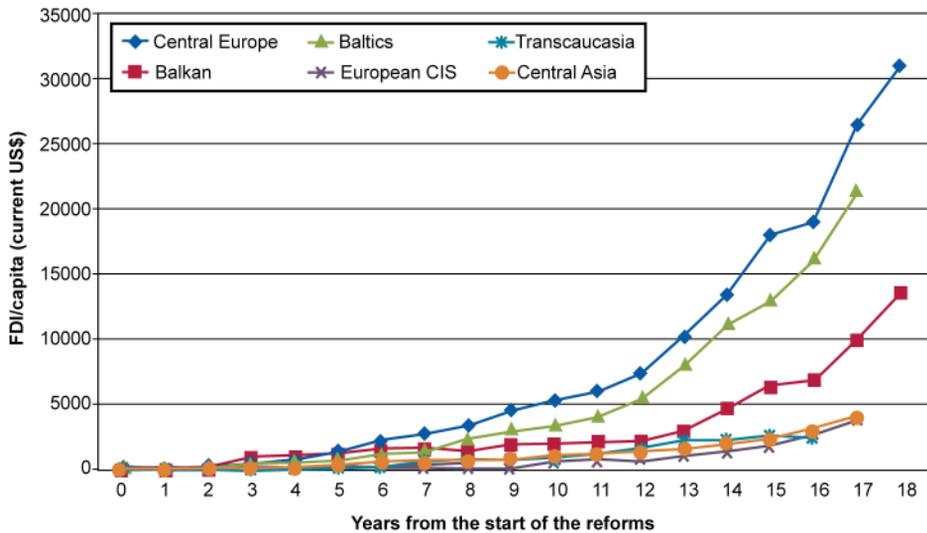


Figure 10.9. Evolution of FDI per capita in selected Former Soviet Union republics

Source: UNCTAD 2008.

the growth in productivity afterward differed strongly among countries and were influenced by the initial conditions, reform policies, and investments in the agri-food industry. We can distinguish four groups with similar patterns.

In the first group are the most economically advanced countries in Central Europe and the Baltic states, such as Hungary, the Czech Republic, Slovakia, and Estonia, which implemented radical reforms. These countries are characterized by relatively high incomes, a capital-intensive agricultural sector, and a big-bang approach to reforms and privatization, including restitution of land to former owners. The loss from forgone economies of scale was limited because the restitution of agricultural land to the previous owners led to consolidation of land in large farming enterprises. In addition, a massive outflow of agricultural labor occurred early in transition, facilitated by a well-developed social safety net system and radical reforms, which stabilized the macroeconomic environment. This outflow of labor caused substantial gains in labor productivity in the early transition period. Later, productivity gains were reinforced by spillovers from the large inflow of FDI in the agri-food sector. Investments, through vertically integrated supply chains, improved farmers' access to credit, technology, inputs, and output markets.

A second pattern can be seen in the poorer countries in Central Europe and the Balkan states, including Romania, Bulgaria, Lithuania, and Poland. These countries were very diverse in their initial farm structure. Before transition, Poland already had mainly small family farms, whereas in Lithuania, Romania, and Bulgaria the agricultural sector was concentrated in large corporate farms. However, in all countries, labor outflow from agriculture was limited in the early transition period. In these countries, agriculture served as a social buffer in times when overall unemployment was high and social benefits were low. The restitution of land to the former owners constrained access to land for young farmers, since that land was given to older people who started farming to complement their small pensions. Because the agricultural sector in these countries was relatively capital-intensive, the breakup of the corporate farms into small family farms caused significant losses in economies of scale and yielded only limited gains from the shedding of labor. Initially, both output and productivity declined. In countries such as Poland and Lithuania, output and productivity started to recover in the mid-transition period stimulated by FDI. In Romania and Bulgaria output and productivity recovered only slowly, and at the end of the 1990s they decreased again as a result of the financial

crisis. From the beginning of 2000, the outflow of inefficient labor and the inflow of FDI started a sustained recovery.

Third, a group of poor Transcaucasian and Central Asian countries, such as Armenia, Azerbaijan, Kyrgyz Republic, and Tajikistan, followed yet another pattern. These countries are characterized by their poverty and the absence of a good social safety net system, their labor-intensive agricultural systems, and their slower progress in overall reforms. In these countries, agriculture also provided a buffer role and a labor sink. Reforms caused a strong shift from large scale toward individual farming—especially when land distribution in kind to households was introduced after the failure of the share distribution system became evident. The reforms also caused a substantial inflow of labor into agriculture and growth in the importance of more labor-intensive sectors, such as horticulture and livestock. This caused a decrease in labor productivity, while land productivity grew. Although there has been substantial growth in yields, labor productivity is still substantially below pre-reform levels in Transcaucasia.

A fourth pattern is seen in a group of middle-income Former Soviet Union countries, including Kazakhstan, Russia, and Ukraine. In these countries, there was almost no outflow of agricultural labor and, since output fell substantially in the 1990s, agricultural labor productivity declined strongly. Reforms were implemented only slowly, and soft budget constraints continued, which favored the large-scale farms and constrained restructuring, with limited efficiency gains. Only after the Russian crisis in 1998 did the macroeconomic situation improve, with enhanced competitiveness of the domestic agricultural sector through exchange rate devaluations and the inflow of revenues from increasing oil and mineral prices. This particularly affected Russia and Kazakhstan. Ukraine implemented a series of important reforms in the late 1990s. Since then, agricultural productivity has increased in these countries, as liquidity in the economy and investments in agriculture increased. Surplus employment started to decline gradually. An important factor in the growth of productivity since 2000 was increased investments in the food industry, which benefited agriculture through vertical integration.

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