

Chapter 2

The Arena and the Common Heritage

The transition countries in Europe and Central Asia (the ECA countries) stretch over 11 time zones from Prague in the west to Vladivostok in the east and from the shores of the Arctic Ocean and the Baltic Sea in the north to the Adriatic Sea, the Black Sea, and the borders of Iran and Afghanistan in the south. Although much of this gigantic space is uncultivable tundra and taiga, the ECA countries account for 19% of the world's arable land resources and 7% of the population (FAO data). Controlling some of the most fertile soils in the world, this region has a clear potential to generate agricultural surplus beyond the needs of its population, which can be exported to feed poorer nations.

Of the 26 ECA countries listed in Table 1.1, our discussion focuses on 22. These 22 transition countries include 12 former Soviet republics that are currently members of the Commonwealth of Independent States (CIS), three Baltic states that formerly were part of the Soviet Union and are now regarded as components of Central Eastern Europe, five former Comecon countries in Central Eastern Europe (which became six when Czechoslovakia split into two), and Albania in the Balkans. In the context of transition, the 12 former Soviet republics are described as the CIS bloc, and the other 10 countries constitute the CEE bloc (CEE actually stands for Central Eastern Europe, but also includes Albania). In this chapter we review the situation in the pre-transition decades, when the three Baltic states were part of the Soviet Union. We accordingly refer to all 15 former Soviet republics (the 12 CIS countries and the three Baltic states) as USSR, and retain the term CEE for the remaining six countries in Central Eastern Europe and the Balkans. In the later chapters that deal with the transition decade in the 1990s the term CEE encompasses 10 countries (including the three

Baltic states), the term CIS refers to the 12 CIS members, and the term USSR is generally not used.

Although the two new “blocs”—CEE and CIS—are evenly matched by the number of countries, CIS in aggregate is much larger than CEE. The CEE countries account for about 15% of agricultural land and less than 20% of rural population in the ECA region. On the other hand, just four of the 12 CIS countries—Russia, Ukraine and Belarus in Europe and Kazakhstan in Central Asia—represent 75% of agricultural land and 55% of rural population in the entire region. Figure 2.1 and Table 2.1 highlight the extremely uneven distribution of land and rural population among different groups of ECA countries. This view of the countries does not account for agro-climatic and soil-quality differences, which are quite extreme on their own, but given the sheer magnitude of agriculture in the four large CIS countries, its fate may have strong global implications, both economic and social, much stronger than the fate of agriculture in all other ECA countries.

Fig. 2.1. Population and Arable Land in ECA Countries: 1980s

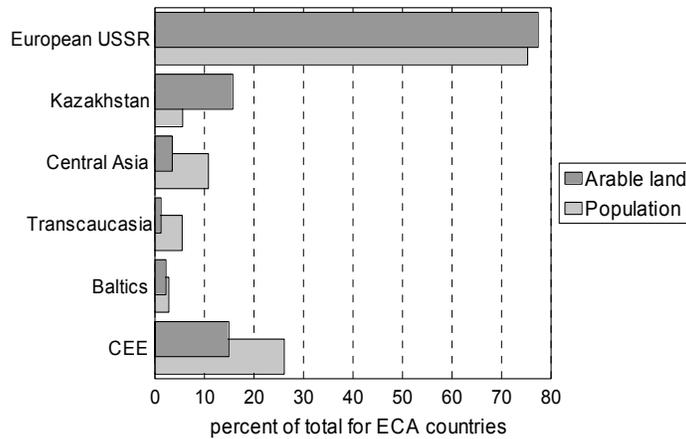


Table 2.1. Regional Shares in Land, Population, and Employment in 1980s (percent of total for 22 ECA countries)

	Agricultural land	Arable land	Population	Rural population	Agricultural employment
All ECA countries (22)	614.8 thou. ha	267.4 thou. ha	375.5 million	139.7 million	37.4 million
USSR (15)	90.5	85.1	73.9	70.3	69.5
European (4)	44.2	65.8	55.6	46.0	47.0
Kazakhstan	31.8	13.4	4.1	4.9	4.3
Central Asia (4)	11.8	3.0	8.0	12.9	11.5
Transcaucasia (3)	1.4	1.0	4.1	4.7	5.1
Baltics (3)	1.3	1.9	2.1	1.8	1.6
CEE (7)	9.5	14.9	26.1	29.7	30.4

Note: European USSR (4) – Russia, Ukraine, Belarus, Moldova
 Central Asia (4) – Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
 Transcaucasia (3) – Azerbaijan, Armenia, Georgia
 Baltics (3) – Estonia, Latvia, Lithuania
 CEE (7) – Czech Republic, Slovakia, Hungary (CEE West), Poland, Bulgaria, Romania, Albania (CEE East)

Source: USSR Statistical Yearbooks for the Soviet republics and Comecon Statistical Yearbooks for CEE.

Agricultural Profile of the Region

The ECA countries comprise a large and diverse agricultural region (Brooks 1991). In the northern tier, stretching across Russia, Belarus, the Baltics, Poland, and former Czechoslovakia, grains (except for maize) and roots dominate the field crops, while imports augment domestic production of feed to sustain a large livestock industry. In Ukraine, Moldova, Hungary, and Romania moisture and warmth are adequate for maize and oilseeds, and mixed grain/livestock farming predominates. The mountainous southern tier stretching from the Caspian across the Black Sea to the Adriatic (Transcaucasia, Bulgaria, Albania) is rich in orchards, vineyards, and tobacco plantations, which often have to rely on irrigation to supplement relatively scant rainfalls. Still further south and inland, the Soviet Central Asia on the southeastern border with Iran and Afghanistan is the largest area of irrigated agriculture in the world, where cotton and wheat fields cling to the banks of rivers and canals, quickly blending into desert pastures that can only support special hardy species of sheep and camels.

Overall, the entire ECA region could be characterized as relatively rural and agrarian even during the 1980s. The share of rural population exceeded 40% both in the USSR and in CEE (Table 2.2; for detailed country data see Table A2.1 in the annex at the end of the chapter). Russia was the only country with less than 30% of the population living in rural areas, and the three Baltic republics on average were also somewhat less rural than the rest of the region. In Central Asia, on the other hand, the share of rural population reached 60%. Rural people in socialist countries suffered from low mobility and were typically restricted to working in agriculture. The share of agriculture in total employment was accordingly fairly high, approaching 30% for the USSR and 25% for the CEE countries. The agrarian gap between the USSR and CEE broadened when measured by the share of agriculture in GDP: agriculture contributed 24% of GDP in the 15 Soviet republics and only 15% of GDP in CEE. The aggregate ratio of agricultural output to labor—a measure of labor productivity in agriculture relative to the rest of the economy—was thus higher in the USSR than in CEE.

Table 2.2. Agrarian Characteristics and National Income in Socialist Economies in the 1980s

	Share of rural population*	Share of employed in agriculture*	Share of ag in GDP**	Share of livestock in ag output**	Share of arable land in ag land**	GNP per capita#, \$	GNP per capita#, % of Middle Income group
CEE (7)	44.9	24.8	14.6	48.5	64.6	3,075	105
CEE West (3)	40.8	14.1	10.2	55.7	64.6	4,755	163
CEE East (4)	47.9	32.9	17.8	43.1	64.7	1,815	62
USSR (15)	44.4	27.4	23.8	50.7	43.8	2,266	78
Baltics	31.7	18.1	21.6	69.3	68.7	3,242	111
European USSR	39.5	24.8	22.7	52.3	69.8	2,544	87
Transcaucasia	42.1	27.3	18.0	41.1	32.4	1,727	59
Central Asia	57.2	35.0	28.4	44.1	14.8	1,662	57
ECA countries (22)	44.5	26.6	20.6	50.0	50.4	2,536	87
Market economies	25.1	5.5	2.8	47.4	52.4	--	719
USA	25.1	3.2	2.0	47.4	43.5	--	850
Canada	23.8	5.0	3.0	41.2	61.2	--	633
European Union	25.9	8.4	3.5	53.9	52.6	--	675

*Average 1980-89; ** 1987; # Average 1987-89.

CEE West – Czech Republic, Slovakia, Hungary; CEE East – Poland, Romania, Bulgaria, Albania.

Source: USSR Statistical Yearbooks for the Soviet republics and Comecon Statistical Yearbooks for CEE; GNP data from World Development Indicators database.

There was, and still is, a significant difference in the structure of agricultural land resources between the USSR and CEE. The CEE countries have a relatively low proportion of pastures and hay meadows: 65% of their agricultural land is arable. In the USSR, on the other hand, less than 45% of agricultural land is arable, and without the Baltics (where the share of arable land approaches 70%, as in the CEE countries) the proportion dips below 40%. Central Asia and Transcaucasia are particularly well endowed with pastures: the share of arable land is less than 15% in the Central Asian countries and about 30% in Transcaucasia. The pastures in these two regions are different, however: desert pastures in Central Asia and mountain pastures in Transcaucasia.

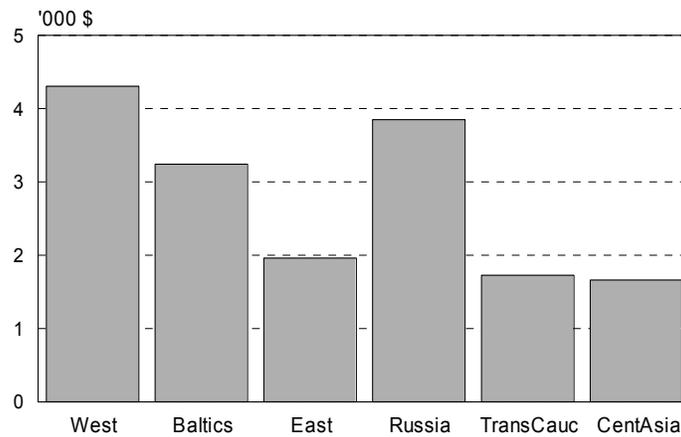
One would tend to think that a higher share of pastures would lead to greater specialization in livestock production. Yet this was definitely not the case in socialist agriculture. A strong positive correlation is observed between the share of agricultural product derived from livestock and the share of arable land in countries across the region. Countries with a high share of arable land (and a low share of pastures) were in fact characterized by high livestock specialization. This phenomenon is particularly vivid for the Baltic republics, where 70% of agricultural land was arable and 70% of agricultural product was from livestock production. Outside the Baltics, the phenomenon is clearly traced in Russia, Ukraine, Belarus, Bulgaria, Hungary, and Czechoslovakia. This is probably a reflection of central planning and large-scale industrialization tendencies that characterized socialist agriculture. In the interest of intensive production, livestock was fed on grain and concentrated feed, rather than allowed to graze in natural pastures. Arable land was thus an important source of animal feed in socialist agriculture, and pastures did not play a role in determining the specialization in crops or livestock.

Relative Wealth Across the Region: Per-Capita GNP

Although the aggregate ratio of agricultural output to labor was higher in the USSR than in CEE, the standard of living in CEE, and especially in the western countries (Hungary and Czechoslovakia), was generally higher than in the USSR. This was primarily due to the contribution from more developed non-agricultural sectors of the economy. One of

the “east-west gradients” often discussed informally among scholars is the national wealth gradient: the per-capita GNP increases as one gradually moves westward from Central Asia to Transcaucasia, thence to the European USSR with the neighboring eastern CEE countries, the Baltic republics, and finally the western CEE countries. Figure 2.2 demonstrates the general existence of this “east-west gradient” in per-capita GNP in the 1980s, with Russia an obvious exception to the rule: the per-capita GNP in Russia was much closer to that in the western CEE countries (Czechoslovakia, Hungary, Poland) than to its more easterly neighbors (Belarus, Ukraine, Moldova, Bulgaria, and Romania). Russia’s special political position in the Soviet bloc, and its mineral wealth, obviously had tremendous economic benefits for its population.

Fig. 2.2. Per-Capita GNP: East-West Gradient



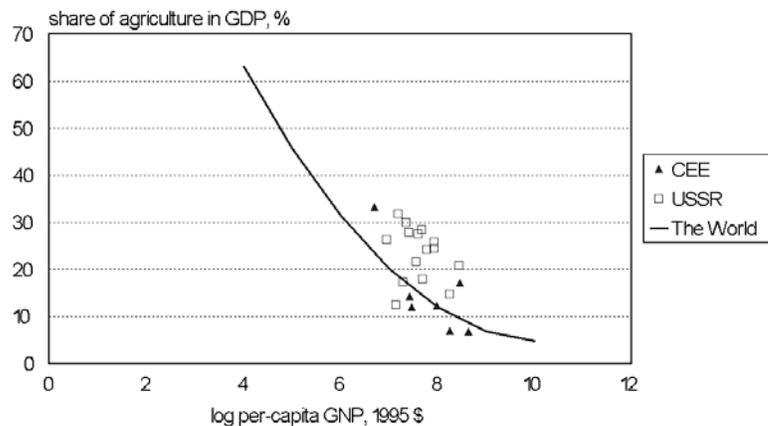
ECA Countries and the World Compared by Agriculture’s Share in GDP and Labor

We have stated several times that agriculture was an important sector in the economy of pre-transition countries in the ECA region. Indeed, the share of agriculture in GDP and in employment in these countries was much higher than in market economies (see Table 2.2). But the market economies were represented by USA, Canada, and the European

Union—very rich and highly industrialized countries with high levels of GNP per capita. The per-capita GNP in these high-income market economies was 7 times the average level for Middle Income Countries, whereas the ECA countries in the 1980s bracketed the Middle Income Countries, with per-capita GNP levels ranging from 0.5 to 1.6 times the Middle Income Countries average. Since agriculture is always more important in countries with a lower level of GNP per capita, the ECA countries should properly be compared to countries in the same range of per-capita GNP instead of the richest market economies.

In Figure 2.3 the scattergram of points plots the share of agriculture in GDP for the ECA countries in the second half of the 1980s. The downward sloping curve represents “the World”: it is based on the analysis of Chenery and Syrquin for more than 200 countries from all income categories (see Box 2.1 for details). Of the 22 ECA countries, 15 lie above the “World Curve”. Of these 15 countries, only two are from CEE and the rest are Soviet republics. There was a clear tendency for the ECA countries, and especially for the Soviet republics, to operate with higher shares of agriculture in GDP than in countries with comparable levels of GNP per capita in the rest of the world. The mean share of agriculture in GDP for the ECA countries is 20.6%, whereas the predicted share from the “World curve” is 14.5% (the difference is statistically significant at $p < 0.01$). ECA countries in the pre-transition period were indeed characterized by relatively large agriculture whose contribution to the national economy was higher than in the average country with the same per-capita GNP.

Fig. 2.3. ECA Countries and the World:
Agriculture's Share in GDP in 1980s



Box 2.1. How was the “World Curve” constructed?

Chenery and Syrquin (C-S) in their studies of patterns of development* examined the relationship of per-capita GNP with various development indicators. The development indicators included final demand variables, trade and production, employment, and relative prices. The two indicators that are relevant for our purposes are the share of agriculture in GDP and in employment.

C-S used a sample of more than 100 economies from low, medium, and high income groups, excluding what they called the communist economies, i.e., the ECA countries on which we focus in this book. In their analysis, they regressed each development indicator on a quadratic of per-capita GNP (in constant dollars) and population (to reflect the differences in size across countries). Both the share of agriculture in GDP and the share of agriculture in employment were found to decrease (nonlinearly) with the increase in per-capita GNP.

We repeated the C-S analysis for the period 1980-88 using the same sample of countries and the same source of data – the World Bank’s World Development Indicators database. Regressing the share of agriculture in GDP on per-capita GNP and population, we obtained the equation

$$\begin{aligned} \text{share of agriculture in GDP} = \\ 134.15 - 31.22 \cdot \log(\text{per-capita GNP}) + 1.55 \cdot [\log(\text{per-capita GNP})]^2 \\ + 6.52 \cdot \log(\text{population}) - 0.36 \cdot [\log(\text{population})]^2 \end{aligned}$$

The share of agriculture in GDP was expressed in percent, per-capita GNP in constant 1995 dollars, and population in millions. The regression was based on 774 observations from 92 countries (multiple years for each country), producing a good fit with $R^2 = 0.787$ and all coefficients statistically significant at $p < 0.01$. The original C-S model included a period dummy to differentiate between decades. No such dummy was necessary in our analysis, because the data were restricted to a relatively short period 1980-88.

Substituting in this equation the mean population for the group of ECA countries (17 million in the 1980s), we used the reduced two-dimensional form to plot the “World Curve” shown in Figure 2.3.

The same analysis for agricultural labor produced a similar downward-sloping equation:

$$\begin{aligned} \text{share of agriculture in labor} = \\ 194.43 - 36.67 \cdot \log(\text{per-capita GNP}) + 1.34 \cdot [\log(\text{per-capita GNP})]^2 \\ + 9.74 \cdot \log(\text{population}) - 0.53 \cdot [\log(\text{population})]^2 \end{aligned}$$

Here the fit was even better with $R^2 = 0.854$ (based on 817 observations in 93 countries).

* Hollis Chenery and Moises Syrquin, *Patterns of Development 1950-1970*, World Bank and Oxford University Press (1975); Moshe Syrquin and Hollis Chenery, *Patterns of Development 1950 to 1983*, World Bank Discussion Paper 41, World Bank (1989).

The same analysis of the share of labor in agriculture produced an opposite result. Although the share of agricultural labor looks very high compared to that in the industrialized market economies, it is in fact significantly lower than the share of labor predicted from the “World Curve” for countries with the corresponding level of GNP per capita. Thus, for income levels between \$1,500 and \$5,000 (in 1995 dollars) characteristic of the ECA countries, the mean share of labor in agriculture is 32% from the “World Curve” compared to less than 27% for the ECA countries. The intense industrialization drive of the Soviet era had had at least a partial impact, encouraging labor to exit from agriculture to a significantly greater extent than in other countries with comparable levels of wealth (although not by as much as in the rich industrialized countries).

This discrepancy between “agrarian characterization” in terms of GDP and in terms of labor probably stems from the statistical peculiarities of GDP estimation in socialist countries. Here GDP was traditionally determined as “gross material product”. It included the material production industries, such as manufacturing, construction, transport, and of course agriculture, but it did not include the service industries, which are by definition part of GDP in “capitalist” statistics. However underdeveloped were the service industries, they existed and the share of agriculture in “socialist” GDP was thus overestimated compared to the share of agriculture in “capitalist” GDP. This difference in statistical methodology may explain the result that we observe in Figure 2.3. Since labor statistics is free from such biases, we tend to place more credence in the interpretation provided by the analysis of agricultural employment.

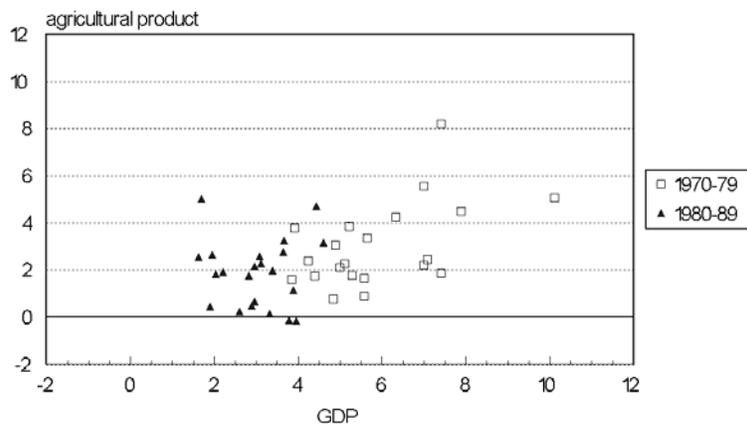
Growth, Employment, and Productivity of Labor

The 1980s was a decade of moderate growth in the pre-transition countries: GDP increased on average by about 3% annually and agricultural output grew by about 2% annually. This growth was much slower than in the previous decade of the 1970s, when GDP increased by 6% annually and agricultural output by 3%. Figure 2.4 clearly shows how the growth rates of the ECA countries as a group were generally higher in the decade of the 1970s (white squares) than the growth rates in the 1980s, the last decade before the transition (black triangles). This

pattern explains why Gorbachev in the mid-1980s began stressing the unsatisfactory performance of agriculture in terms of “return on investment”: in his public speeches he decried the negative gap between the volume of investment in agriculture and agricultural growth (later this gap was empirically analyzed by Easterly and Fischer in a series of articles in 1993-95).

There was relatively little variability in growth rates across the socialist countries in the 1980s, although in this particular decade the Soviet republics (including the Baltic states) showed faster growth in GDP than the CEE countries: 3.3% annually for the USSR compared with 2.2% for CEE (the difference in GDP growth rates is statistically significant, while the difference in agricultural product growth is not). By contrast, agricultural employment trends revealed substantial differences across the region.

Fig. 2.4. Pre-Transition Growth: Two Decades
(annual growth rate in percent)

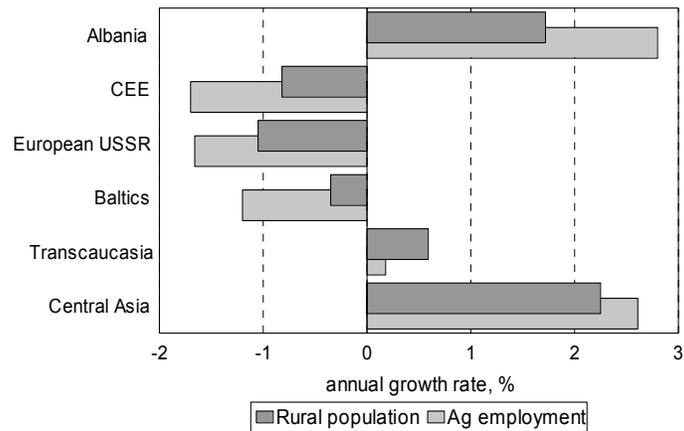


In most countries agricultural employment declined over time, probably because the overall economic growth was creating new job opportunities and the agricultural population responded by shifting to alternative occupations (CEE, the Baltics, and the European USSR). Indeed, a fairly strong negative correlation is observed between changes in agricultural employment and changes in GDP in the 12 countries with declining agricultural employment: a 1% increase in GDP is

associated with a 0.2% decrease in the number of employed in agriculture (the result is significant at $p < 0.1$). However, in the other nine countries (Central Asia, Transcaucasia, and Albania) the number of employed in agriculture increased over time despite a healthy growth in GDP. This was due to the relatively fast population growth in these countries. The rural population grew during the 1980s at an average annual rate of 2.3% in Central Asia and 1.7% in Albania (compared with an annual decline of 1.1% in the European USSR and 0.8% in the CEE countries excluding Albania). The rural population in these countries increased faster than the rate of creation of new employment opportunities in the economy, and rural residents who could not find other jobs simply stayed in agriculture.

Figure 2.5 demonstrates the very strong positive correlation between the growth rate of the rural population and the change in agricultural employment across the region. This correlation provides a better explanation of the changes in agricultural employment than GDP growth in all CEE and CIS countries, probably because of the low mobility of the rural population in the socialist era.

Fig. 2.5. Rural Population and Agricultural Employment in the 1980s



Since agricultural output generally increased in all the countries across the region, the different patterns of change in agricultural employment are reflected in changes in the productivity of agricultural

labor. The productivity of agricultural labor, calculated as the ratio of agricultural output to agricultural employment (see Chapter 5 for details), increased in all the countries where the number of employed in agriculture was decreasing. As noted previously, this group included all CEE countries (except Albania), the Baltic republics, and the European USSR. By contrast, Central Asia, Transcaucasia, and Albania showed generally declining (or at best unchanged) productivity of agricultural labor in the 1980s.

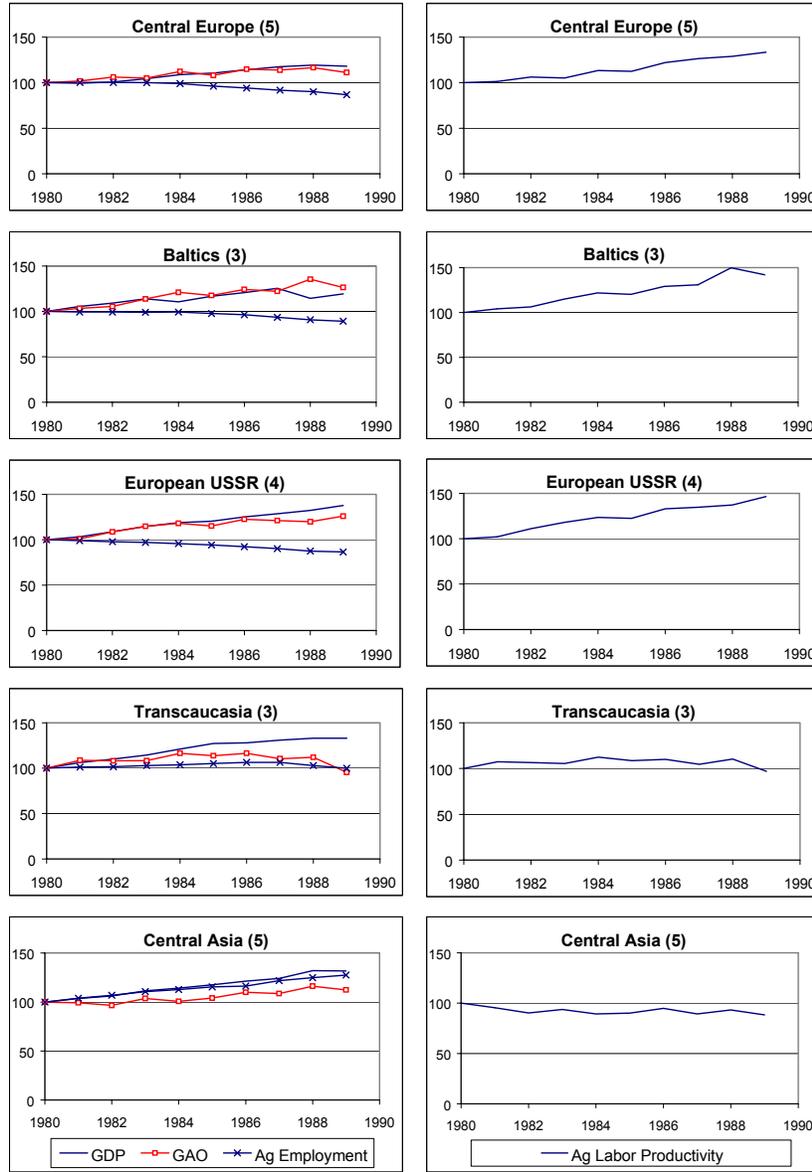
There was thus a clear separation of the pre-transition countries into two large groups by the four development or growth variables, the “western” countries and the “southeastern” countries. All socialist countries achieved fairly high growth in GDP and lower but still respectable growth in agricultural output in the pre-transition decade (Table 2.3 and Figure 2.6; for detailed country data see Table A2.2 in the annex at the end of this chapter). The “western group” (including 6 CEE countries without Albania, the Baltics, and the European USSR) showed declining agricultural employment and increasing labor productivity in agriculture; the “southeastern” group (Central Asia and Transcaucasia in the USSR, plus Albania in CEE) showed increasing agricultural employment and declining (or in case of Albania essentially unchanged) productivity of agricultural labor.

Table 2.3. Clustering of Socialist Countries by Four Development Variables (1989 in percent of 1980)

	GDP	Agricultural output	Agricultural employment	Agricultural labor productivity
All socialist countries	128.8	116.6	100.5	120.1
CEE (5, excl. Albania)	117.2	117.2	86.7	135.0
Albania	124.8	130.6	126.5	103.3
USSR (15)	132.8	115.4	103.4	116.3
Baltics (3)	128.3	126.4	89.2	142.1
European USSR (4)	137.7	126.0	86.5	146.3
Transcaucasia (3)	132.8	95.4	99.8	97.0
Central Asia (5)	131.7	112.4	127.6	88.4

Source: see Table 2.2.

Figure 2.6. Patterns of Growth and Productivity in the Pre-Transition Decade



Organization of Agriculture in the Soviet Period: The Common Heritage

The countries of CEE and CIS entered the transition in 1989-91 with a common institutional and organizational heritage in agriculture: most land, regardless of its ownership, was cultivated collectively in large-scale collective and state farms that managed thousands of hectares and employed hundreds of member-workers; the commercial production from the collective and state sector was supplemented by subsistence-oriented individual agriculture based on rural household plots of less than one hectare; product markets and input supply channels were largely controlled by state organizations within an administrative command framework; production targets were set centrally; budget constraints to penalize under-performers virtually did not exist. This, in effect, was the Soviet model of socialist agriculture. It was introduced in the USSR in the early 1930s as a result of Stalin's forceful collectivization drive, and spread to dominate all other countries in the region by the 1950s, following the emergence of communist regimes in Central Eastern Europe after World War II. Poland and the former Yugoslavia partially deviated from this common pattern: their agriculture remained largely based on small individual farms throughout the decades following World War II, and yet central controls plagued farmers in Poland and Yugoslavia exactly as in all other socialist economies.

Despite pervasive collectivization, individual or private agriculture never disappeared in the socialist countries. The so-called socialized farm sector coexisted with the individual sector in a distinctly dual or bimodal farm structure. Most agricultural land, regardless of ownership, was cultivated in socialized, or "public-sector" farms. A relatively small number of socialized farms (about 60,000 in total over the entire ECA region) controlled about 95% of agricultural land and produced most of the commercially marketed output. The average socialized farm cultivated 2,000-3,000 hectares of land with 300-500 workers. Alongside these large-scale farms, millions of households cultivated small plots averaging less than 0.5 hectare, which in aggregate controlled about 5% of agricultural land. The household plots relied on part-time family labor and produced mainly for subsistence, although part of the output always found its way to farmers' markets in nearby towns. Despite their small size and their small share in agricultural land, household plots

always achieved relatively high levels of productivity. In the Soviet Union, where output data for household plots are available over long periods of time, the individual sector produced 20% of gross agricultural output on 2% of land, achieving a relative productivity factor of 10. The socialized farm sector, on the other hand, produced 80% of output on 98% of land, achieving a relative productivity factor of 0.8 only.

In terms of the legal form of organization, the socialized farms were organized as state farms and as collective farms (Soviet terminology) or cooperatives (East European terminology). In state farms, all productive assets were owned by the state and the farm workers were salaried state employees, basically not different from workers in state-owned industrial enterprises. In collectives and cooperatives, the productive assets were jointly owned by the members, who provided the labor and in principle were compensated through distribution of farm earnings instead of receiving salaries. Whether identified as collectives or cooperatives, the socialized farm structures were very far from the Western model of a cooperative. The main attribute of cooperation—the principle of voluntary association for mutual benefit—was abandoned during Stalin’s forced collectivization campaign in 1929–1930. Instead, the creation of all collective and cooperative farms in the former socialist countries (both before and after World War II) relied on political and psychological coercion and was often associated with considerable brutality against the rural population. As a consequence, members in collectives and cooperatives never enjoyed another basic attribute of Western-style cooperation—the freedom of exit.

The organizational differences between collective and state farms (called *kolkhozes* and *sovkhozes* in standard Russian-based terminology) are summarized in Table 2.4. These differences, however, were often very blurred. In the Soviet Union, collective farm members in reality did not have to rely on the uncertain stream of farm earnings, as they were guaranteed a minimum wage since Khrushchev’s time in the 1960s. If farm earnings proved insufficient to meet the minimum wage, the missing funds were remitted from the state budget. In Bulgaria, on the other hand, state-farm employees were compensated like collective farm members since the 1960s: 90% of the annual salary was paid out monthly, while 10% was held back until the end of the year, when the payment was adjusted for the actual farm earnings (this formula was obviously adopted to increase the motivation of state-farm employees for better performance). As a result of such blurring of differences,

collective and state farms were often transformed from one organizational form to another by central fiat. This phenomenon of arbitrary transformation between collective and state farms was not restricted to the Soviet Union: it was widely practiced also in Central Eastern Europe, especially in Albania, Bulgaria, and Romania. We generally do not make any distinction between collective and state farms in our analysis, using interchangeably the terms “farm enterprises,” “large farms,” “socialized farms,” or “socialist farms” to designate the organizational forms in collectivized socialist agriculture.

Table 2.4. Prototype Features of Collective and State Farms

	Collective farm (kolkhoz)	State farm (sovkhoz)
Ownership of land	State, with collective user status	State
Ownership of non-land assets	Collective with relatively less capital*	State
Financing of capital investment*	Long-term loans from the government	New equity from the state
Status of residents	Collective members	Sovkhoz employees
Individual income	Distribution of residual collective income	Salaries and wages
Subsidiary income	Household plots	Household plots
State pension	None before 1960s	Always
Internal passport	None before 1960s	Always
Management	Chairman: formally elected but candidates restricted to nomenklatura	Director: appointed
Responsibility for rural social services	Yes (mainly in USSR)	Yes (mainly in USSR)

*Kolkhozes were often converted to sovkhozes if a major capital investment was necessary.

Responsibility for the rural social services and village infrastructure was an important task of the socialized farms in the USSR (in many CEE countries, village councils and municipalities, not cooperatives, remained responsible for social infrastructure). The socialized farms were never pure business operations. In addition to agricultural production, they were directly entrusted with maintaining the entire range of social services in the village. The salaries of teachers, doctors, and postal personnel were paid by the government, but the actual disbursement was carried out by the local farm enterprise, which was subsequently reimbursed by transfers from the state budget. School

buildings, clinics, shops, and other public facilities in the village were maintained and often built by the farm enterprise, with or without reimbursement from the government. Housing, power, water, and heat were provided in the villages by local farm enterprises, generally free of charge to the workers. It is hard to overestimate the role that socialized farms played in developing and maintaining the rural social infrastructure. In effect, they were directly responsible for the standard of living of the rural population in USSR: the rural population looked to the local farm enterprise to answer all the daily needs and the government expected the farm enterprise to act as its willing and dedicated agent in these matters.

How was all this paid for? This is one of the mysteries of opaque Soviet accounting. The socialized farms were simply doing the state's bidding—in food production as well as in maintenance of social infrastructure. The costs of maintaining the social sphere in the village were generally absorbed into overall production and operating costs. It was the state's responsibility to make sure that the socialized farms survived and continued to function. This was accomplished through a wide range of financial instruments, which extended far beyond direct payment for products delivered. Price subsidies for inputs and products, financial transfers to weak or loss-making farms, central redistribution of funds from profitable to unprofitable farms, generous allocation of long-term government credits, usually interest-free—all these were capital injections from the government that enabled the farm enterprises to continue fulfilling their mission, i.e., producing food for the cities and taking care of the rural population.

Ignoring for the moment the economic disadvantages of the system in which business operations are intermixed with responsibility for the social sphere, this is the place to state that under the prevailing system the rural population was well taken care of and apparently quite satisfied with its standard of living. The availability of various consumer services and consumer goods in the village was always on a lower level than in the cities, but the rural population enjoyed the luxury of more spacious housing, while rural incomes did not lag substantially behind the incomes of urban families. Thus, the level of wages in agriculture was on a par with the average wage, while rural families had the additional benefit of production from their household plot, which supplied much of the domestic food needs and also provided some cash from sales of surplus. While the large collective and state farms were economically inefficient (see below), they certainly ensured a comfortable work

environment and an adequate standard of living for the rural population. This was largely made possible by significant transfers of subsidies from the government to agriculture, often at the expense of other less-favored sectors of the economy.

We now proceed to consider two sets of attributes that always sharply distinguished socialist farms from farms in a market economy. These attributes concern the operating structure of farms and the size of farms as measured by land and labor.

Operating Structure of Socialist Farms

The socialist collectives and state farms operated in a centrally planned environment. Their objectives were determined by the central plan: the highest priority was attached to meeting the production targets. Considerations of efficiency and profitability were of secondary importance.

Table 2.5 summarizes the main operating decisions of a farm in a market economy and contrasts them with the operating decisions of a collective or state farm in a centrally planned economy. Market-oriented farms are profit maximizers. To achieve maximum profit, they maximize sales by producing in response to consumer demand and minimize costs by controlling labor, input purchases, capital investment, and borrowing. Centrally controlled farms focus on physical output, not sales. They have no levers to control costs, because they are committed to lifetime employment of their members, their inputs are push-delivered at non-negotiable prices by state planning authorities, their capital investments are dictated by the production plan, and their credit is supplied by the government from residual cash-flow considerations, without any regard to repayment capacity. As a result, profit and cost-efficiency did not play any role in the decision-making process of farms in a centrally planned environment. Farms essentially operated on a “cost-plus” basis, with all cost overruns guaranteed by the state—a very poor prescription for efficiency.

Productivity and efficiency were also adversely affected by labor policies. The socialist farms could fire a worker only in exceptional circumstances (a serious crime, uncontrollable drunkenness). The guarantee of lifetime employment introduced a strong element of moral hazard in labor relations in farm enterprises. Workers felt they did not

have to exert a maximum effort, because there was no punishment for under-performance. This led to low productivity of labor, as workers in socialist farms were allowed to produce less per unit of time or unit of wages than their counterparts in market-oriented organizations with a strictly enforced labor discipline. These negative effects of lack of discipline enforcement are well known in labor-managed firms and production cooperatives everywhere in the world (Deiningner 1993; Schmitt 1993).

Table 2.5. Operating Decisions of Farms in Socialist and Market Economies

Business component	Decisions in a market economy	Decisions in a socialist economy
Sales	Produce in response to consumer demand	Produce to meet centrally imposed targets
Costs	Institute cost controls	“Cost-plus” accounting
Labor	Adjust labor force to changing production volume/mix	Labor force fixed: workers guaranteed lifetime employment
Purchased inputs	Seek best suppliers, control purchase quantities	Inputs push-delivered at state-fixed prices and in quantities determined by production quotas
Depreciation	Acquire new equipment only if added depreciation is justified by increased volume or by savings in other costs	New equipment deliveries determined by central planning; depreciation treated as an active source of cash
Credit/financial expenses	Borrowing limited by risk of bankruptcy (hard budget constraints)	Credit allocated centrally to cover deficits (soft budget constraints)
Profit	Maximize profit by controlling sales and costs	Profit uncontrollable

In a market economy, debt and borrowing have implications that reach far beyond the impact of financing expenses on the profit account. The borrowing decision of a market entity always balances the benefits of debt (ready availability to support growth, relatively low cost and tax shield to increase profitability) with the associated risks (inability to repay the loan and the potential for bankruptcy). This is the essence of the hard budget constraint: a market-oriented entity will not borrow indefinitely to satisfy all its cash needs, because excessive borrowing eventually leads to ultimate failure through bankruptcy. In a market environment, hard budget constraints are enforced by a combination of

internal discipline and the practices of the commercial banking system. Banks impose a system of checks and balances on the borrowers (both existing and potential) with the understandable motive of safeguarding their loans against default. Complex credit-check systems, requests for cash-flow projections, profit forecasts—all are part of the normal banking practices in market economies, designed to minimize the incidence of default. Lending and borrowing are not automatic: the borrower has to pass certain creditworthiness thresholds before being allowed to borrow.

In a centrally planned environment, banks did not have this role. They were used by the government as a fiscal tool. Farms did not have to apply for debt. Debt was used by government to cover the farm's cash-flow deficits and accounting losses. There was an implicit understanding that this debt had no potential to bankrupt the farms whatsoever. In other words, the state implicitly relieved the farms of the responsibility for repayment and assumed the full risks that under market conditions may lead to bankruptcy. Centrally planned farms essentially operated under soft budget constraints: they could (and did) receive as much credit as was necessary to meet their cash-flow requirements, without any regard to risks of non-repayment. Collective and state farms thus operated with very few restraints on their costs and investments, because any overruns would automatically be covered with credit channeled by banks on instructions from the government.

In his classical work on the socialist economic system Janos Kornai (1992) characterizes the softness of budget constraints by the commitment of the government not to tolerate persistent loss-making. Soft budget constraints prevail when economic agents believe that they can negotiate various benefits after the fact in case of adverse outcomes (lack of profitability). The feasibility of this vertical negotiation process stems from the paternalistic attitude of the government toward the farm enterprises, similar to the attitude of parents toward financial difficulties of their children, regardless of age. In this conceptual setting, soft budget constraints are not limited to actual allocation of subsidized credits or debt write-offs. They often include an implicit component that arises when the government does not insist with all strictness on collecting tax arrears or, even more indirectly, signals suppliers or banks not to press too hard for collection of overdue obligations from farms.

Because of the mentality of soft budget constraints, unprofitable farms did not go bankrupt. There were no self-limiting risk mechanisms on the amount of accumulated debt. The socialist farms were able to

continue borrowing from suppliers, from the state, and from banks, presumably because everybody—the borrowers and the lenders—believed that the government would not let the large farm enterprises go bankrupt and would continue to arrange for periodic bailouts.

Farm Sizes

Table 2.6 presents information about the average size of socialized farms (for detailed country data see Table A2.3 in the annex to this chapter). In the 1980s, the average farm enterprise in the USSR had over 4,000 hectares of sown land and employed 500 workers. The average farm enterprise in CEE had 2,000 hectares of sown land and employed 560 workers. The farms look much larger if the entire endowment of agricultural land is taken into account. Including pastures and hay meadows, in addition to sown land, the average socialized farm controlled more than 10,000 hectares of agricultural land in the USSR and nearly 3,000 hectares in CEE. The gap in farm sizes measured by sown land and total agricultural land was substantially greater in the USSR than in CEE because of the greater extent of pastures in the Soviet republics, especially in Central Asia and Transcaucasia.

Table 2.6. Farm Characteristics in Socialist and Market Economies in the 1980s (per farm averages)

	Agricultural land, ha	Sown land, ha	Workers	Tractors	Tractors and combines
Socialist economies (22)	9,791	3,514	512	54	68
USSR (15)	10,899	4,133	498	55	71
European USSR (4)	6,820	4,085	462	53	69
Kazakhstan	75,555	14,153	664	95	140
Central Asia (4)	42,096	2,098	933	80	86
Transcaucasia (3)	2,297	656	407	22	25
Baltics (3)	3,598	2,378	370	54	66
CEE (7)	2,778	1,962	563	47	55
Market economies	225	77	2.0	1.7	2.8
USA	187	97	1.4	2.5	3.7
Canada	231	126	1.6	2.7	3.9
Argentina	469	N.A.	3.9	0.6	0.7
European Union (12)	13	7	1.1	0.8	N.A.

Source: USSR Statistical Yearbooks for the Soviet republics and Comecon Statistical Yearbooks for CEE; labor data for CEE from country statistical yearbooks.

There was, of course, considerable variability in farm sizes across countries. Kazakhstan and Bulgaria stand out as countries with exceptionally large farms—more than 10,000 hectares of sown land per farm. The reasons for such large farms in these two countries are different. Kazakhstan gained huge arable areas through the opening up of virgin lands for cultivation in the Khrushchev and Brezhnev era, and these new lands were generously assigned to farms. While very rich in land, the farm enterprises in Kazakhstan employed a relatively small labor force. Bulgarian farm enterprises, on the other hand, were huge both by the amount of land and the number of workers. Bulgaria did not gain any new land through reclamation or irrigation projects after World War II, but it pursued an aggressive program of merging cooperatives and state farms into gigantic agro-complexes in the (misguided) hope of achieving economies of scale. Each of the 300 Bulgarian agro-complexes was formed from dozens of smaller farm enterprises, whose resources were pooled into huge entities averaging 10,000 hectares and 3,000 workers. No other country came even remotely near the average number of workers per farm in Bulgaria.

To get a sense of how large the socialized farms were it is useful to compare the average farm size in socialist countries with the benchmarks in some market economies. The average farm size in a particular country depends on the available resources, in total and per capita of rural population. Differences in average farm sizes across countries are therefore a natural outcome of differences in natural conditions, and as with any comparison care must be exercised to compare like with like. We have chosen for comparison the farms in USA, Canada, Argentina, and the European Union. While the population density in the European Union was much higher than in the USSR, it was not much different from that in CEE. The agricultural areas in the other three countries—USA, Canada, Argentina—are as sparsely populated as in the USSR, and their climates and soils are fairly similar. Unlike Western Europe, these are land-rich countries with grain and livestock producing agricultures, similar in many respects to the agriculture that prevailed in the USSR in the 1980s.

Table 2.6 presents the comparison of the average farm sizes in socialist and market economies. While the average socialized farm in the USSR had 11,000 hectares of agricultural land and 4,000 hectares of sown land, farms in USA and Canada averaged about 200 hectares of total land and 100 hectares of cropped land. Farms in Argentina were larger than in North America, but even here the average was about 500

hectares. On the whole, USSR farms were one-two orders of magnitude larger than the farms in market economies with comparable agricultures. Farms in CEE were smaller than in the USSR, but they were nevertheless an order of magnitude larger than in USA, Canada, and Argentina, despite the much smaller endowment of land per capita in CEE. The CEE farms were two orders of magnitude larger than farms in the European Union, where the land endowment was similar.

The positive evidence of market economies thus suggests that socialist farms were much larger than the norms observed in market agriculture. The farm sizes in socialist countries were determined by socialist ideology, which emphasized industrialized and mechanized agriculture as a development path for relatively backward agrarian societies. On a political level, a relatively small number of large farms were easier to control in a centrally planned environment than hundreds of thousands and millions of small family farms. Specifically, central procurement of grain and other food commodities for the growing urban populations was much easier to enforce among large farms than among scattered multitudes of individual peasants, as Soviet politicians were reminded by the memories of the 1918-21 famine in Russia and Ukraine. This mixture of ideological and political considerations led to collectivization and ultimately the creation of very large farms.

Socialist farms were large by all three main factors of production: land, labor, and machinery. The average socialized farm had nearly 70 pieces of farm machinery (counting tractors and combines, regardless of their horsepower rating), compared with 4 (three tractors and one combine) for the average farm in USA or Canada (the average EU farm had less than one tractor). The managers of socialized farms thus had to contend with considerable difficulties scheduling and monitoring hundreds of workers and tens of pieces of machinery.

Our discussion of farm sizes is not intended to advocate one optimal farm size, and it is certainly not to be construed as suggesting that small farms are best. Yet the world experience indicates very clearly that, on average, the socialist farms are too large and the optimum size (however elusive the concept) is in all probability substantially smaller. As we have noted previously, farm sizes vary depending on the resource endowment in each country. In market economies, farms grow through the medium of land markets, which allow resources to flow from inactive or less efficient owners to more efficient active farmers. The maximum size in each particular case depends on the managerial capacity of the operator. Our interpretation of the world experience

with farm sizes suggests that, instead of deciding a priori that large farms are best, as dictated by the socialist ideology, we should allow market forces—in particular land markets—to adjust farm sizes and determine the optimal size in each individual case depending on human and physical capital. We will return to this issue later on in our discussion of why socialist agriculture was inefficient.

Intensity of Factor Use

Since socialized farms had so much more land than farms in market economies, it is relevant to examine the intensity of labor and farm machinery per unit of land in socialist agriculture. Table 2.7 clearly shows that socialized farms were much more labor intensive than farms in USA and Canada. They operated with a work force of more than 300 people per 1,000 ha, while North American farms employed less than 15 workers per 1,000 ha. The CEE farms used 250 workers per 1,000 ha (excluding Albania, which had an exceptionally high labor intensity even by socialist standards—more than 1,200 workers per 1,000 ha), while the much smaller farms in the neighboring countries of the European Union operated with half that number.

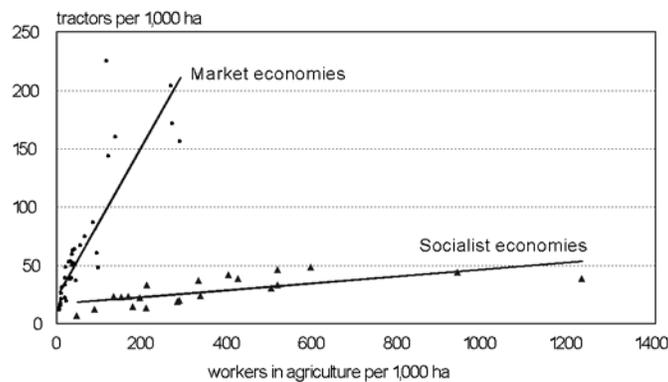
Table 2.7. Pre-Transition: Labor and Machine Intensity

	Workers per 1000 ha	Tractors per 1000 ha	Tractors per 100 workers
Socialist economies (22)	369	20	10
USSR (15)	346	29	10
Baltics (3)	151	23	15
European USSR (4)	221	22	10
Transcaucasia (3)	652	36	6
Central Asia (5)	379	33	10
CEE (6)	264	24	9
Albania	1228	39	3
Market economies			
USA	14	26	182
Canada	13	22	169
EU12	144	104	72

Source: For socialist economies: USSR Statistical Yearbooks and Comecon Statistical Yearbooks; labor data for CEE from various country statistical yearbooks. For market economies: Eurostat 1999, US Census of Agriculture 1987, US Agricultural Statistics 1998, Canada Census of Agriculture 1986, Historical Labor Force Statistics 1997; EU tractors from World Bank.

The level of mechanization, on the other hand, shows a different picture. Socialized farms appear to have been under-mechanized despite the persistent mechanization efforts in all socialist countries that resulted in large machinery parks in absolute numbers. The use of machinery per 1,000 ha in both CEE and USSR ran at about the same level as in USA and Canada (although roughly at one-quarter of the level in the European Union), but there was a sharp mechanization gap between socialist and market economies in terms of the ratio of machinery to labor. Socialized farms operated with about 10 tractors per 100 workers. Farms in USA and Canada had more than 150 tractors per 100 workers, and European Union farms about 70 tractors per 100 workers. These numbers characterizing the pre-transition decade of the 1980s are consistent with the findings of Johnson and Brooks (1983), who analyzed the two previous decades 1960-79. During that twenty-year period, farms in the USSR operated at mechanization levels of 40 horsepower per agricultural worker, while farms in market economies (as represented by ten mid-western and south-western states in the USA

Fig. 2.7. Machinery and Labor in Market and Socialist Economies



and four central provinces in Canada) operated with 1,100 horsepower per worker.

Data for three decades convincingly show that, compared to farms in market economies, the large socialized farms were over-staffed and at the same time under-mechanized, despite the large absolute size of their machine park. This point is clearly illustrated in Figure 2.7, where the relationship between mechanization and labor intensity is described by

two distinct regression lines for socialist and market economies (we are obliged to Pepijn Schreinemachers for this analysis). Farms in market economies used less labor and more machinery per unit of land, while farms in socialist economies used more labor and less machinery per unit of land. This was not necessarily a bad tradeoff for socialist agriculture, as labor was plentiful and cheap (due to government policies), while machinery was scarce and thus relatively expensive (due to the vagaries of centrally planned industry). Unfortunately, the a priori reasonable substitution of labor for machinery failed to produce an efficient agriculture, as we shall see in the next section.

Inefficiency of Socialist Agriculture

Visible manifestations of the inefficiency of socialist agriculture began to be felt with particular clarity in the late 1980s. Despite decades of centrally planned growth, urban consumers in the USSR were experiencing food shortages, extensive rationing had to be instituted, and long queues for food became a routine phenomenon. As a result, the free prices in collective farm markets (where Soviet farmers were allowed to sell directly to consumers) rose by about 50% in 1989-1990, while the official state prices for food remained fixed (Cook 1992).

These dramatic events were actually a cumulative outcome of a long process of development that characterized Soviet agriculture and Soviet economy in general. We have noted previously that the growth rates (for both GDP and agricultural output) were significantly lower in the 1980s than in 1970s. This was a continuation of a trend that began to be observed in the 1960s: the annual growth rates of agricultural production in the USSR as a whole dropped from 4% in 1966-70 to 1% in 1981-85 (Cook 1992). This was a particularly alarming trend because investments in agriculture continued at a relatively high and increasing level: Soviet agriculture's share in total investment rose from 21% in 1966-70 to 24% in 1981-85. New investments in agriculture were thus producing decreasing marginal returns and failed to sustain sectoral growth. The Soviet leadership was aware of this phenomenon: Gorbachev began referring to the specific difficulties with return on investment in agriculture in his public speeches in 1985, while the scientific community had been providing evidence of this effect since the early 1960s.

This situation was not unique to Soviet agriculture. It was replicated throughout the entire Soviet economy, where capital investments were not producing sufficient output growth. The marginal product of capital in the USSR dropped dramatically from 25% in 1960 to 3% in 1986, as the capital-to-output ratio increased monotonically from 2.5 in 1960 to 5.0 in 1986 (Easterly and Fischer 1995). Since the capital-to-output ratio in industry increased only from 2.5 to 3.0 during the same period, other sectors of the Soviet economy—agriculture included—were much more inefficient in the utilization of new investment than industry.

Soviet economic growth, and with it growth in agriculture, was accomplished mainly through increasing the use of inputs and capital, and not through productivity increases (Ofer 1987). Such extensive growth must eventually hit the barrier of decreasing marginal returns in any economy, but in the Soviet Union growth was declining while investment was rising since 1950—primarily due to inefficient use of resources.

Johnson and Brooks (1983) analyzed the technical efficiency of Soviet agriculture using data for all fifteen republics of the USSR during the twenty-year period 1960-1979. Their results indicate that the productivity level of Soviet agriculture was substantially lower than that for market economies, which were represented by a number of geographically comparable states in the USA and the central provinces of Canada. The productivity level of agriculture in market economies was found to be about 2-2.5 times the productivity level of Soviet agriculture, depending on the particular estimation scheme used.

The partial productivity of land in Soviet agriculture, as measured by the gross output of agricultural products per hectare, was somewhat higher than the partial productivity of land in market economies during the twenty-year period studied by Johnson and Brooks (Table 2.8). This is consistent with the observed yields of various crops, which generally were not much different from the yields in Western countries (milk yields were always much lower in the USSR than in Western agricultures). Soviet and market agricultures differed primarily by the productivity of agricultural labor. Labor productivity was lower by a factor of ten or more in the Soviet republics compared with the US and Canada (Table 2.8). This low productivity of agricultural labor is clearly a reflection of the very high labor intensity of Soviet agriculture—the Soviet farming sector employed too many people in relation to the output it produced. In support of this observation, we should note the very low ratio of farm machinery to labor in Soviet farms.

Mechanization of agriculture was the pride of Soviet agricultural policy, and yet Soviet farms operated with less than 50 horsepower per worker, compared with more than 1,000 horsepower per worker in US and Canada (see the discussion of the intensity of factor use in the preceding section). Even allowing for the lower horsepower rating of Soviet farm machinery, a difference of nearly two orders of magnitude in the mechanization rate definitely suggests over-employment of labor in Soviet agriculture.

Table 2.8. Productivity and Input Use in Socialist and Market Economies#

	Output per hectare of land	Output per worker
1960-1979 (Johnson and Brooks)		
Soviet republics	6.76	105
Market economies*	4.62	1,215
1985 (USDA)**		
Soviet republics	237	4,962
CEE (w/out Baltics)	622	4,582
Market economies:		
USA	433	43,248
Canada	210	23,142
EC-12	803	13,854

*Ten states in the USA and four provinces in Canada. The averages do not include Finland, which is the fifteenth country included by Johnson and Brooks in their analysis.

** World Agriculture: Trends and Indicators, 1970-91, Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture, Statistical Bulletin number 861 (1997).

#Units of measurement: Johnson and Brooks – tons of wheat per cultivated hectare and per thousand days worked; USDA – dollars (crop production per hectare and agricultural output per agricultural worker).

Econometric analysis of gross agricultural product in the fifteen Soviet republics as a function of various factors of production (such as land, livestock, capital, labor, and fertilizer use) was carried out by Kriss (1994) for the period 1965-90—a full quarter-century of Soviet agricultural data. The results of this analysis are reproduced in Table 2.9, which in addition to the agricultural output per worker (in constant 1983 rubles) and the annual growth rate of agricultural output also gives the gap in the productivity level of each Soviet republic relative to Russia (for technical details see Box 2.2). The analysis of productivity levels clearly divides the Soviet republics into two groups. The high-productivity republics include the core group of Russia, Ukraine,

Belarus, Moldova, and Kazakhstan, plus two of the Baltic states (except Latvia). The low-productivity group includes the four Central Asian republics and the Transcaucasian states (plus Latvia). The productivity of these republics was 20%-30% below the level of Russia, other core republics, and the Baltic states. Thus, even if we assume that the productivity in the European part of the USSR was on a par with market economies (a highly dubious assumption given the findings of Johnson and Brooks), half the Soviet Union—seven out of fifteen republics—grossly under-performed the developed world.

Table 2.9. Productivity Indicators of Agriculture in Soviet Republics: Pre-Transition Period 1965-1990

	Agricultural output per worker, thou. rubles	Average growth rate of agricultural output per worker, %/year	Deviation of productivity level in agriculture from Russia's average level, %
Central Asia			
Turkmenistan	5.4	1.4	-29.2
Kyrgyzstan	6.1	1.5	-20.5
Uzbekistan	5.4	0.75	-27.5
Tajikistan	5.6	0.8	-25.8
Transcaucasia			
Azerbaijan	6	1.9	-20.5
Georgia	4.9	2	-16.8
Armenia	5.4	1	-18.7
Core republics			
Kazakhstan	8.4	1.7	+9.6
Russia	7.7	2.3	0
Ukraine	7.1	2.8	+2.3
Belarus	7.4	3.2	+2.2
Moldova	5.5	2.4	+3.2
Baltic republics			
Lithuania	9.7	2.2	+11.4
Latvia	9.6	1.3	-2.2
Estonia	12.8	1.4	+18.8

Source: Kriss (1994); based on official published data of the USSR State Committee on Statistics.

Box 2.2. How to Measure Differences in Productivity Levels?

Productivity is defined by the amount or value of output produced by a given bundle of inputs. If only a single input is considered, the result is partial productivity, such as partial productivity of land (output per hectare) or the partial productivity of labor (output per worker). If all inputs are bundled in the analysis, the result is total factor productivity—the productivity of all factors of production used to generate the output. Productivity levels are derived by constructing or estimating production functions, which are multiple regression models relating output to all relevant inputs or factors of production (land, labor, farm machinery, fertilizer, water, etc.). To reflect differences in productivity levels between different units of analysis (regions, countries, organizational forms), the multiple regression model is modified to include a dummy variable that represents the type or category of each unit. Thus, in the analysis of Soviet republics carried out by Kriss, the dummy variable had values (levels) from 1 to 15 corresponding to the fifteen Soviet republics. In the Johnson and Brooks analysis, the dummy variable had only two values identifying Soviet republics and non-Soviet countries.

The production function is usually estimated in logarithmic form (the so-called Cobb–Douglas model), and for different levels of the dummy variable 1, 2, ... (i.e., for different countries or regions) we get separate equations of the form

$$\log(\text{Output}_1) = a_1 + b * \log(\text{Factor}_1) + c * \log(\text{Factor}_2) + d * \log(\text{Factor}_3) + \dots$$

$$\log(\text{Output}_2) = a_2 + b * \log(\text{Factor}_1) + c * \log(\text{Factor}_2) + d * \log(\text{Factor}_3) + \dots$$

These equations differ only by the intercept term a_1 or a_2 , which determines the “level” of the production function for country 1 or 2. The “slope” coefficients b , c , d are usually assumed homogeneous, or equal, for each level of the dummy variable. When the equations are differenced, all the terms corresponding to the production factors cancel out, and after taking the antilog of the difference we are left with the ratio

$$\text{Output}_1 / \text{Output}_2 = \exp(a_1 - a_2)$$

The gap between the output in region or country 1 (Output_1) and the output in region or country 2 (Output_2) is thus determined by the difference ($a_1 - a_2$) of the intercept terms of the production functions for regions 1 and 2. Exponentiating this difference and subtracting 1 we obtain the productivity gap in percent. Johnson and Brooks in one of their estimations, obtained $a_1 = 4.31$ in the production function of the non-Soviet countries and $a_2 = 3.45$ in the production function of the Soviet republics. This gave $(a_1 - a_2) = 0.86$, or $\text{Output}_1 / \text{Output}_2 = \exp(0.86) = 2.36$. The output level in the non-Soviet countries was thus 136% higher than the output level in Soviet republics for the same bundle of inputs.

The inefficiency of Soviet agriculture relative to market economies documented so forcefully by Johnson and Brooks (see Table 2.8) is largely a legacy of the Soviet economic system. Yet Central Asia and Transcaucasia shared the same economic and political legacy with the rest of the USSR, and still showed poor performance relative to the European republics. Even if this comparison is fundamentally unfair, as any comparison between Asia and Europe is likely to be, it certainly raises the question of the impact of social and cultural factors on agricultural performance. Kazakhstan is located in Central Asian, a neighbor to Uzbekistan and Kyrgyzstan, but its very large Russian ethnic population made it socially and culturally closer to the Slavic republics of the Soviet Union. Is it possible that we are witnessing here a local variant of the “Wasp work ethic,” *mutatis mutandis*?

The inefficiency of socialist agriculture finds a reflection both in farm accounts and in public finance. The traditional policy in all socialist countries was to maintain low and stable retail food prices for the benefit of the consumers. These prices were insufficient to cover the production costs. In other words, socialist farms were making losses given the level of food prices and the level of production costs. In a market economy, the danger of bankruptcy inherent in such a situation provides a stimulus for farms to improve their cost efficiency and return to profitability. In a centrally controlled economy, on the other hand, farms rely on cost-recovery principles and their losses are made up by transfers from the state budget. Profitability at the farm level was sustained through injection of generous producer subsidies by the government. Data from the USSR in the second half of the 1980s — Voronezh Oblast (Cook 1992) and Novgorod Oblast (Rabinovich 2000)—show that, without subsidies paid in the form of price supplements to producers, most farm enterprises would report losses instead of profits in their annual financial statements (Table 2.10). Data for the generally profitable Leningrad Oblast indicate that, without price subsidies, the profit margins would be cut by one-half. The various subsidies and transfers to agricultural producers naturally imposed a heavy burden on the budget, especially since 1985. Net transfers from the budget to the entire agro-industrial complex (including primary agriculture, processing, and other agricultural services) exceeded 40 billion rubles annually since 1985, contributing between 50% and 90% of the budget deficit (the exact percentage varied from year to year; see Cook 1992). Although the specific numbers are based on two provinces

in the USSR, the general pattern is valid for agriculture in most socialist countries.

Table 2.10. Impact of Producer Price Subsidies on Farm Profitability (percent of sales)

Year	Novgorod Oblast		Leningrad Oblast	
	Profitability as reported	Profitability without subsidies	Profitability as reported	Profitability without subsidies
1985	7	-13	n.a.	n.a.
1986	7	-13	21	14.4
1987	1	-19	22	14.9
1988	22	-12	21	9.5
1989	21	-13	18	7.2
1990	19	-17	21	11.4

Farm entitlement status: share of price subsidies in total transfers	Voronezh Oblast	
	Profitability with price subsidies	Profitability without subsidies
Under 10%	8	3
11-20%	10	-5
21-30%	16	-10
31-40%	21	-17

Source: Novgorod and Leningrad oblasts from Rabinovich (2000); Voronezh Oblast from Cook (1992).

Why Socialist Agriculture was Inefficient

Table 2.11 summarizes the inherited features of socialist agriculture that have been discussed in previous sections and highlights the aspects of each feature that could be responsible for inefficiency. The centrally planned environment was of course the main cause of inefficiency of socialist agriculture. Central planning insulated the farms from market signals, imposed plan targets as a substitute for consumer preferences, and allowed farms to function indefinitely under soft budget constraints without proper profit accountability. Efficiency was never an objective in socialist agriculture: meeting production targets at any cost was the main priority. D. Gale Johnson (1982) noted that “in most centrally planned economies the policy setting of socialized agriculture can hardly be described as supportive of a low-cost and efficient agriculture.”

Yet beyond the policy setting the inefficiency of socialist agriculture can be attributed also to two “micro-level” factors, which sharply

distinguished socialist agriculture from agriculture in market economies: exceptionally large farm sizes and collective organization of production. This section reviews some of the theoretical reasons for inefficiency of large farms and collectives. It also shows that Russian scientists (and politicians) had been aware of these factors for several decades before the beginning of transition.

Table 2.11. Inherited Features of Socialist Agriculture

Attribute	Shortcomings
Centrally prescribed production targets	Inefficient due to lack of consumer orientation, insensitivity to market signals
Soft budget constraints	Inefficient due to lack of profit orientation, reliance on writeoffs and subsidies
Collective organization of production	Inefficient due to free riding, moral hazard, lack of individual incentives: remuneration does not depend on effort
Large farms (2,000 ha, 500 workers)	Inefficient due to high monitoring costs, anonymity, lack of transparency
Lifetime employment policy for farm members	Inefficient due to inability to control costs by adjusting labor
No effective individual ownership of land and production assets	Inefficient due to non-transferability of land and assets and lack of incentives associated with property rights: “workers do not own the fruits of their labor”

Why large farms are relatively inefficient

The typical farm size in socialist countries was an order of magnitude larger than the average in land-rich market economies, such as USA or Canada. The excessive size was reflected not only in large land endowments, but also in the large number of workers employed (in absolute terms and per hectare of land) and in large machinery parks (in absolute numbers). Such large farms are a rarity in market economies, because they are relatively inefficient due to high transaction costs (including the cost of monitoring labor and various agency costs associated with hired management) and can survive in a competitive environment only under special circumstances. As to the other micro-level factor, collective farms—in the form of production cooperatives or communes—are very rare in market economies today, also

apparently because of their inherent inefficiency stemming from a variety of behavioral and governance features.

The Soviet ideology and politics always emphasized large industrialized and capital-intensive farms. In principle, industrialization and mechanization is economically justified if there are economies of scale. Such economies exist in some branches of agriculture, and do not exist in other branches. For instance, livestock enterprises that rely on industrially manufactured feed easily grow to industrial-scale operations even in market economies. Large pig and poultry “factories” have evolved with major capital investments all over Maryland and Delaware in the USA, and they appear to be more profitable than smaller livestock operations, at least if we are willing to ignore the serious damage they cause to the environment. But economies of scale are much more elusive in primary agriculture, i.e., crop production and pasture-based livestock breeding.

Lumpiness or fixity of assets is one of the main factors contributing to economies of scale. To justify the purchase of a tractor or automatic milking equipment, the farmer must have more than a certain minimum area of land or a certain minimum number of cows. However, in a market economy, machinery need not be purchased, as it always can be rented when needed (Binswanger et al. 1995). There is no need to maintain a permanent labor force of 300 or 500 workers to meet the seasonal peak demand for labor, as workers always can be hired in the labor market when needed and for just as long as needed. These considerations, however, were not valid in the socialist centrally controlled environment. Lack of machinery leasing services, labor exchanges, and other factor markets encouraged the development of large-scale farms, supplying an economic rationale, in a strictly non-market setting, for the ideological and political agenda. In a market setting, however, the farm sizes achieved in the former socialist countries are far too large compared with the “best practice” farm sizes observed in market economies, and their sheer size probably renders them uncompetitive in a market-oriented environment.

Agency theory introduced the concept of transaction costs into the analysis of economies of scale. As farms become larger, the costs of monitoring the operations and enforcing labor discipline increase, eventually offsetting the benefits from economies of scale, even if they exist (Schmitt 1963; Allen and Lueck 2002). Livestock “factories”, where production is concentrated in a single relatively small locale, are easier to monitor than livestock grazing in mountain pastures or cotton

harvesting over thousands of hectares. The transaction costs are lower, and these enterprises can effectively grow to a larger maximum size. There were only two examples of very large farms in USA history. One was the case of Southern cotton plantations before the Civil War and the other the case of so-called “bonanza” farms in the wheat-growing Mid-West in the second half of 19th century. Each of these large-farm categories owed its existence to a very special and distinct set of circumstances. Both were highly profitable in their time, but they disappeared when the environment changed. The large cotton plantations disappeared with the abolition of slavery in the Southern states after the Civil War, when labor discipline and labor monitoring considerations changed dramatically. The wheat-growing bonanza farms, created on free land grants to railroad executives along the newly constructed railroads in the Mid-West, disappeared after less than a decade as the absentee landlords found it impossible to recruit capable managers for efficient running of the large labor force and the large machinery park on their “industrial” farms (Drache 1964; Allen and Lueck 2002).

Today, the only example of very large farms in market economies is provided by plantations of perishable crops that require close coordination between harvesting, packing, and shipping, such as bananas and pineapples. These crops must be delivered to the market within a minimum time after they are harvested, as otherwise they will spoil and become unsalable. The compressed delivery schedule requires investment in packing, refrigeration, and shipping facilities, which is usually achieved through vertical integration with non-farming corporations. The advantages of timely delivery of these crops to the markets are sufficient to offset the monitoring and other transaction costs associated with the large scale of the operation. Perishability is not a factor for cotton, grain, potatoes, or even apples, and economies of scale are not sufficiently pronounced to justify large farms for these typical crops grown in the former Soviet Union.

Why production cooperatives are relatively inefficient

The inefficiency of socialist agriculture was also strongly influenced by labor behavior. Workers in large farm enterprises did not feel it necessary to exert the maximum effort in their work. First, the policy of lifetime employment shielded them from the ultimate sanction—firing—by which effort is enforced in market economies. Second, the

large size of the labor force and the enormous span of the fields made it very difficult to monitor the behavior of each worker at the actual work place. Without monitoring, enforcement of effort through basic persuasion and example also becomes impossible. Third, the socialist-collective organization of production ensured practically equal remuneration for everybody and broke the link between what workers received and the amount of effort they put into their work. These factors, dependent as they were both on large size and on collective organization, combined to reduce the workers' incentives to exert sufficient effort. The input of effort per unit of time or unit of wages was relatively low in large collectives, and this adversely affected productivity and profits.

These phenomena are known weaknesses of production cooperatives everywhere in the world (Deininger 1993; Schmitt 1993). All production cooperatives based on member labor suffer from shirking and free riding behavior among the members. In socialist agriculture, these weaknesses were further aggravated by monitoring and enforcement difficulties associated with size (also a well-known universal factor) and by the evils of the administrative command system (a unique feature in the socialist countries).

Causes of inefficiency as viewed by socialist scientists

Politically and ideologically, the socialist world was committed to the Soviet model of agriculture. Yet politicians and scientists were aware of the shortcomings and inefficiencies of their system, and significant reform attempts continued all through the years, especially after Stalin's death in 1953. The reforms generally dealt with technical symptoms (e.g., optimal production planning) and did not treat the root of the problem—central command, large size, and collective organization, which remained sacrosanct. And yet recognition of the true organizational causes of inefficiency began to emerge already in the early 1960s, especially in the scientific community. A group of researchers around Vladimir Tikhonov, who in 1965 was appointed the head of the newly established Institute of Organization and Incentives of Labor in Agriculture, forcefully advocated the transition to small work units (“up to 6-8 members” instead of the traditional 100-200 in a typical collective farm) with freedom to decide both on production techniques and on product mix and with payment based on actual effort and quality of output (Bashmachnikov 2000). The advantages of the small work unit

were identified as stemming from its closeness to the family unit, which these scientists acknowledged as the best natural form of organization for farming. In their view, the large farm enterprises had to fulfill a support role, providing the full range of farm services to the small work units—in other words, act as service cooperatives supporting nearly individual producers.

Research into the function and role of the household plots, representing the individual farming sector in the socialist countries, also began in the 1960s. This “individual farming” school (associated with the name of Geliï Shmelev) changed the traditional view of household plots as a decaying remnant of the anti-revolutionary peasant mentality. It focused the attention on their high productivity and major contributions to gross product, while stressing the complex symbiotic relationships with the collective farms. Shmelev’s work in the USSR was later reflected in the West in the large body of work on “Soviet private agriculture” by Karl Eugen Waedekin.

In the best tradition of Soviet science, these schools vocally promoted their findings and conclusions in the political establishment and in the press. Their views certainly influenced the agricultural policies in the 1960s and the 1970s, as is clear, for instance, from the gradually relaxing official attitude toward household plots. Yet ideology and politics precluded more radical reforms based on their teaching. Hungary was the only socialist country that, in the aftermath of the 1956 events, gradually introduced significant changes in the organization of agriculture. Large farm enterprises were encouraged to operate with greater profit orientation, subject to central planning constraints. Individual farming (mainly household plots, but also some small farmers outside cooperative frameworks) received official recognition and were often treated as a formal production sector in large cooperatives, with all that this implied for allocation of resources and product marketing. The Hungarian experience was vigorously studied by Soviet scientists and agricultural policy makers. Unfortunately, no systematic research was undertaken at that time to compare the performance of Hungarian socialist agriculture to other countries following the Soviet model, and we can only speculate today that perhaps the relative success of Hungary during transition is attributable to a certain extent to the changes that it introduced already in the 1960s and the 1970s.

Transition Desiderata: A Conceptual Framework

Catching up with market economies (and perhaps even overtaking them) was always an important consideration for Soviet planners. It is enough to recall Khrushchev's outbursts in the 1950s and the 1960s in which he threatened to "bury" the West—economically if not militarily. The transition to a market-oriented system, emulating the economic order of the more successful capitalist countries, was regarded in the early 1990s as a new strategy to cure the chronic inefficiency of the socialist economic system in general, and socialist agriculture in particular. Because of the broadly common organizational and institutional heritage in agriculture, efficiency considerations suggested a fairly uniform conceptual framework for agricultural reform in all transition countries. On the macroeconomic level, the reform framework called for elimination of central controls, price liberalization, and introduction of hard budget constraints. On the sectoral micro-level, it included a shift from collective agriculture to agriculture based on individual farms and business-oriented corporate units, as well as general downsizing of farms—all in line with the established experience of market economies. The abolition of collective agriculture was naturally to be accompanied by privatization of land, which in Western thinking automatically implies transferable property rights and functioning land markets. Alongside land, all other movable and immovable property—livestock, machinery, farm buildings—had to be privatized as part of the transfer of all factors of production from collective to individual responsibility. Ultimately, such actions could change the entire system of producer incentives, leading to a more efficient and competitive agriculture.

Without in any way detracting from the importance of actions on the macroeconomic level, it is progress on the sectoral micro-level of this conceptual framework that had the potential for a significant impact on the agrarian rural population. As theory suggests, individual responsibility and direct accountability would cure free riding, shirking, and moral hazard that make collective organizations generally inefficient. Smaller farm sizes would be more manageable and less wasteful, reducing the level of monitoring and other transaction costs between managers and workers that are typically high in large organizations. Property rights associated with private ownership of land (or with secure tenure) would induce farmers to put a greater effort into

production. Finally, transferability of use rights would facilitate the flow of land from less efficient to more efficient producers, or more concretely from passive landowners (such as pensioners in an aging population) to energetic active operators.

A strategy of agricultural transition aiming to improve the efficiency and productivity of agriculture in CEE and CIS required the replacement of institutional and organizational features of the former command economy with attributes borrowed from the practice of market economies. Table 2.12 summarizes the ideal transition desiderata. The conceptual framework for transition envisaged a transformation from collective to individual agriculture as the ultimate goal, although it was recognized that some agricultural activities and some subsectors would be characterized by a mixture of individual and corporate forms of organization due to economies of scale and scope. Individual farmers, once established as independent entities, would engage in land-market transactions to optimize the size of the holdings given their management skills and availability of resources. They would form associations to ensure efficient provision of farm services or patronize private commercial suppliers. Pragmatic considerations suggested an intermediate stage involving transition to downsized but still relatively large corporate or cooperative farms based on private ownership of land and assets, with radically modified, profit-motivated management showing significant accountability to individual members and shareholders. Unlike the traditional collectives, these corporate agricultural producers would neither be subject to pervasive intervention of the state nor rely on its largess. It was expected that such a transition framework would lead to market-oriented agriculture with dramatically improved productivity and efficiency.

Table 2.12. Ideal Transition Desiderata

Area	Pre-transition situation	Required action
Production	Centrally prescribed targets	Allow free decisions
Prices	Centrally controlled	Liberalize
Finances	State support, writeoffs	Hard budget constraints
Inputs, sales, processing:	State-owned monopolies	(a) Privatize (b) Demonopolize
Ownership of resources	State, collective	Privatize
Farming structure	(a) Large size (b) Collective organization	(a) Downsize (b) Individualize

Although the common institutional and organizational heritage in agriculture prescribed a conceptually common framework for transition, the adherence to these ideal concepts varied across the region. The implementation in different countries differed in specifics due to differences in political, cultural, social, and also natural conditions. In turn, different implementation strategies have produced dramatically different outcomes and we are actually witnessing the emergence of a sharp “East/West divide” between the agricultural sectors in CEE and CIS—the two subblobs in the formerly Soviet-dominated region. The details of this emerging “East/West divide” in transition agriculture are discussed in the chapters that follow.

Annex to Chapter 2

Table A2.1. Agrarian Characteristics and National Income in Socialist Economies in the 1980s

State	Share of rural population*	Share of employed in agriculture*	Share of agriculture in GDP**	Share of livestock in ag output**	Share of arable land in ag land**	GNP per capita#, \$	GNP per capita#, % of Middle Income group
Belarus	38.5	23.0	24.5	56.9	64.2	2,817	96.5
Moldova	56.6	38.5	30.0	37.7	72.0	1,567	53.7
Russia	28.3	15.0	14.8	61.4	61.3	3,849	131.8
Ukraine	34.8	22.6	21.7	53.1	81.8	1,944	66.6
European USSR	39.5	24.8	22.7	52.3	69.8	2,544	87.2
Armenia	33.5	19.5	17.4	54.6	35.7	1,475	50.5
Azerbaijan	46.5	33.0	12.5	35.4	36.6	1,292	44.2
Georgia	46.3	29.4	24.2	33.2	25.0	2,414	82.7
Transcaucasia	42.1	27.3	18.0	41.1	32.4	1,727	59.2
Kazakhstan	44.4	23.4	28.5	59.5	18.2	2,196	75.2
Kyrgyzstan	62.0	33.0	31.8	60.0	13.9	1,359	46.5
Tajikistan	66.7	42.8	26.3	34.2	21.4	1,055	36.1
Turkmenistan	53.9	38.2	27.6	32.7	3.4	2,037	69.8
Uzbekistan	59.0	37.7	27.8	34.0	17.0	1,662	57.0
Central Asia	57.2	35.0	28.4	44.1	14.8	1,662	56.9
Estonia	29.3	14.9	20.9	71.1	71.4	4,699	161.0
Latvia	30.4	16.1	18.0	69.9	68.0	2,220	76.0
Lithuania	35.3	23.4	25.8	66.8	66.7	2,806	96.1
Baltics	31.7	18.1	21.6	69.3	68.7	3,242	111.0
USSR (15)	44.4	27.4	23.8	50.7	43.8	2,266	77.6

Table A2.1 continued

State	Share of rural population*	Share of employed in agriculture*	Share of agriculture in GDP**	Share of livestock in ag output**	Share of arable land in ag land**	GNP per capita#, \$	GNP per capita#, % of Middle Income group
Albania	65.3	56.1	33.2	31.6	53.1	820	28.1
Bulgaria	36.0	17.0	11.8	55.5	62.0	1,778	60.9
Czech Republic	35.6	12.3	6.6	57.7	54.7	5,639	193.2
Hungary	40.8	17.0	17.0	51.6	77.5	4,770	163.4
Poland	40.3	28.8	12.1	44.4	76.7	2,958	101.3
Romania	50.0	29.7	14.2	40.8	66.8	1,703	58.3
Slovakia	46.0	13.0	6.9	57.7	61.5	3,856	132.1
CEE (7)	44.9	24.8	14.6	48.5	64.6	3,075	105.3
All socialist countries (22)	44.5	26.6	20.6	50.0	50.4	2,536	86.9

*Average 1980-89; ** 1987; # Average 1987-89,.

Source: USSR Statistical Yearbooks for the Soviet republics and Comecon Statistical Yearbooks for CEE; GNP data from World Development Indicators database.

Table A2.2. Growth, Agricultural Employment, and Labor Productivity in Socialist Countries in the 1980s (1980=100)

	Change in GDP 1980-89	Change in ag output 1980-89	Change in ag labor 1980-89	Change in ag labor productivity 1980-89
Moldova	139.3	121	89.4	135.4
Russia	130.3	123	91.5	134.5
Ukraine	130.4	123	83.7	146.9
Belarus	150.7	137	81.3	168.6
European USSR	137.7	126.0	86.5	146.3
Azerbaijan	123.4	99.1	119.6	82.8
Armenia	143.6	93	92.6	100.4
Georgia	131.5	94	87.3	107.7
Transcaucasia	132.8	95.4	99.8	97.0
Kazakhstan	127.2	104	107.6	96.7
Kyrgyzstan	139.2	126	126.9	99.3
Tajikistan	126.1	99	128.3	77.2
Turkmenistan	134.3	129	142.3	90.7
Uzbekistan	131.6	104	132.9	78.3
Central Asia	131.7	112.4	127.6	88.4
Estonia	129.3	110.6	89.8	123.1
Latvia	119.2	126.9	92.4	137.3
Lithuania	136.4	141.8	85.4	165.9
Baltics	128.3	126.4	89.2	142.1
USSR	131.1	119.6	97.0	121.5

Table A2.2 continued

	Change in GDP 1980-89	Change in ag output 1980-89	Change in ag labor 1980-89	Change in ag labor productivity 1980-89
Albania	124.8	130.6	126.5	103.3
Bulgaria	138.7	103.3	73.4	140.7
Czechoslovakia	117.0	116.4	85.1	136.8
Hungary	116.4	105.6	88.3	119.7
Poland	108.3	119.4	87.9	135.8
Romania	108.0	141.0	98.8	142.1
CEE	118.8	119.4	93.3	129.7
All socialist countries	122.0	121.7	92.0	133.8

Source: USSR Statistical Yearbooks for the Soviet republics and Comecon Statistical Yearbooks for CEE; labor data for CEE from country statistical yearbooks.

Table A2.3. Farm Sizes in Socialist Agriculture: Land, Workers, and Machinery per Socialized Farm in the 1980s (10-year averages, per farm)

	Number of socialized farms	Agricultural land, ha	Sown land, ha	Workers	Tractors	Tractors and combines
Belarus	2,611	3,417	2,190	428	48	60
Moldova	835	2,519	1,718	702	63	68
Russia	24,520	8,473	4,756	421	57	77
Ukraine	9,763	3,930	3,199	569	45	55
European USSR	37,728	6,820	4,085	462	53	69
Armenia	781	1,621	525	271	17	19
Azerbaijan	1,387	2,765	905	453	27	30
Georgia	1,294	2,148	478	449	21	22
Transcaucasia	3,463	2,297	656	407	22	25
Kazakhstan	2,513	75,555	14,153	664	95	140
Kyrgyzstan	449	21,626	2,613	882	62	73
Tajikistan	448	8,352	1,606	948	77	80
Turkmenistan	468	124,770	2,146	855	90	93
Uzbekistan	1,902	13,637	2,027	1,045	93	99
Central Asia	5,780	50,139	7,312	843	90	112
Estonia	293	4,490	3,085	412	71	83
Latvia	570	4,041	2,731	414	61	74
Lithuania	1,057	3,094	2,022	338	46	57
Baltics	1,921	3,598	2,378	370	54	66
USSR	48,856	10,906	4,136	499	55	71

Table A2.3 continued

	Number of socialized farms	Agricultural land, ha	Sown land, ha	Workers	Tractors	Tractors and combines
Albania	589	1,907	975	1,197	38	NA
Bulgaria	286	19,464	10,744	3,035	200	230
Czechoslovakia	1,908	2,988	2,199	466	72	82
Hungary	1,544	3,559	2,692	563	35	43
Poland	3,467	1,157	903	300	33	38
Romania	4,116	2,696	1,998	564	41	52
CEE	11,910	2,770	1,956	560	46	56
All socialist agriculture	60,802	9,785	3,725	511	53	68

Source: USSR Statistical Yearbooks for the Soviet republics and Comecon Statistical Yearbooks for CEE, labor data for CEE from country statistical yearbooks.