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Shifts in Eastern German Production Structure Under Market Forces

by

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SHIFTS IN EASTERN GERMAN PRODUCTION STRUCTURE UNDER MARKET FORCES

Introduction

With the substitution of market rules for central planning in eastern Germany the shifts in the production structure are an important question. From the EC perspective there is concern that commodity production in eastern Germany will develop in a manner which contributes to the already existing surpluses of major commodities. For non-EC countries there are concerns over the possible trade impacts. Grain and protein feed exporting countries had a strong market in East Germany during the 1970's. While grain imports fell in the 1980's, imports of protein feed by East Germany remained considerable. With the changed economic conditions questions arose over the short and long-run adjustments. Some observers believed that economic reform would create new market opportunities for exporting countries. Others saw increased output of farm commodities by eastern Germany as more competition on already weak world markets. A third group argued that a China type pattern would appear where short-run output gains would be followed by increased food demand due to per capita income gains. Imports would initially fall, but later would rise.

There are two major objectives for this paper. One is to understand the initial adjustments in the production structure by commodity and why these adjustments occurred. The second aspect of the paper is to guess the future of agricultural production in the longer-run based on the historical experience of the region and on the initial adjustments. Both objectives are intended to facilitate understanding the agricultural trade implications of introducing market forces in eastern Germany. The focus of the paper is on the adjustment in the production structure because there is little evidence of potential demand growth for agricultural goods in aggregate. At most there will be some slight shifts among food categories toward western patterns, particularly a shift to high quality and specialty products (Grings, pp. 192-193; Jahresgutachten 1991/92, p. 78). Additionally, as shown later, evidence from the livestock sector suggests a weakened demand for feedstuffs.

The paper is organized into three major sections. The first section considers agricultural production prior to German reunification in 1990. It looks at the agricultural production structure in the region prior to the division of Germany in 1945 as well as the patterns which arose under the communist government. The second section starts with the 1989 situation and then discusses the initial adjustments seen as market forces are introduced -- 1990 and 1991. The third section builds upon this base to speculate on how the production structure will unfold in the future.

Agriculture in Eastern Germany before Reunification

This section covers the historical experience of agricultural production before reunification, roughly the years 1880-1989. Nothing guarantees that the old production structure will reemerge as conditions have greatly changed. Yet knowledge of the historical record is an

important input into understanding the initial adjustment seen and into speculation over the future.

Natural Conditions

The natural conditions of a region play a role in determining the production structure although technical change has reduced the constraints imposed by natural conditions on production decisions. While extreme cases can be cited, such as Saudi Arabia producing and exporting wheat, natural conditions continue to affect production choices. As in any region of its size, eastern Germany shows a considerable diversity in natural conditions.

Topographically three broad patterns can be distinguished. A substantial part of the country is relatively flat and well designed for crops and livestock. This characterizes the land from the Baltic coast through Berlin and on to around Dresden. Most of Thuringia and large parts of Saxony are rolling. While these are suited to both crops and livestock, some localities --the more rugged ones-- would favor grazing livestock -- cattle. Within eastern Germany there are mountain or foothill regions clearly favoring cattle. These would include the Harz, the Eichsfeld, and the Thuringian forest areas.

Soil conditions vary greatly. Overall the land's basic quality is good (Kloos, p. 6). Of the arable area, 20 percent is sand with little basic productivity, while 40 percent is sandy with medium to good productivity (Kurjo, p. 12). The remainder consists of forest soils which are generally well-drained and of comparatively high quality. Generalizations by state are dangerous since soil types do not respect jurisdictional boundaries. The sandy soils are found in Brandenburg and substantial parts of Mecklenburg-Pomerania whereas the forest soils tend to occur in Saxony-Anhalt, Saxony, and Thuringia. The coastal strip in Mecklenburg-Pomerania has quite good soils, and Saxony-Anhalt is considered to have among the best soils in Western Europe, particularly around Magdeburg and Halle. (A detailed discussion of soil characteristics can be found in Mellor).

Since eastern Germany lies in the center of the continent the climate is considered less favorable to agriculture than is the case in western Germany. Summers are warmer and winters colder with a 10-15 day shorter growing season. Average rainfall is three-quarters of the level for western Germany with several relatively dry areas in the rain shields of the Harz, Eichsfeld, and the Thuringian forest regions (Gebauer, pp. 90-91). Irrigated crops, including grains, in these regions were common in the communist period.

Population pressure on the land also varies regionally. By European standards the northern states of Mecklenburg-Pomerania and Brandenburg are relatively thinly settled with population concentrations increasing to the south. The southern states have a higher, but still comparatively light, population density. Overall the population to land ratio in eastern Germany is much lower than that for western Germany (Kloos, p. 6).

Production Patterns up to the Second World War

Reviewing production patterns by commodity from the late 19th century until the Second World War has two advantages for understanding the future of the region. First, up to 1933 the sector operated in a market economy without central controls being imposed. Secondly, until the end of the Second World War the agricultural sectors of the two parts of Germany were linked. These are the conditions which prevail after German reunification. Yet it would be a mistake to think that the past patterns will simply reappear for the agricultural policy and the technology have changed since 1945. These developments must be considered in speculating on the future.

These two features are reflected in the analysis. Comparisons are made among commodities within the approximate area of the future East Germany to consider changes due to market forces. Additionally, comparisons are made to western Germany since after the Second World War the agricultural sectors were influenced by fundamentally different economic systems.

It is important to be clear about the geographic terms. Germany fluctuated in size considerably over this period. By 1945 about one-third of what had been Germany in 1914 was lost, mostly in the east. This analysis uses the terms "western" and "eastern" Germany as they are presently used. That is, in a historical sense what is called eastern Germany was referred to as middle Germany before 1945.

Not surprisingly data availability becomes more limited as the time period of the set is extended backward. For the major grains and potatoes regional data back to 1888 can be found while series for other crop commodities only stretch back to the late 1920's (Statistisches Jahrbuch für das Deutsche Reich). For livestock a few observations were obtained in the pre-WWI period -- the earliest 1883. The inability to form a data set of consistent length and commodity coverage limits the type of comparisons that can be done.

Among the major grains and potatoes various area trends occurred. Over the 1888 to 1937 period on the land that would approximately become the Democratic Republic (East Germany) wheat, barley, and potato area expanded while rye and oat area fell. In the late 1880's wheat area (including spelt) was around 350 thousand hectares. By the late 1930's wheat area had expanded to around 600 thousand hectares -- actually down from the 1932 and 1933 levels of 712 thousand hectares. The area devoted to barley expanded as well, but the growth was not as large -- from 382 thousand hectares in 1888 to 439 thousand in 1937. Potato area showed a slight increase, going from 717 thousand hectares in 1888 to 850 thousand in 1937. As total agricultural land was relatively fixed expanded areas by some crops came at the expense of others. Rye area fell from around 1.5 million hectares in the late 19th century to 1.2-1.3 million hectares in the late 1930's. Oat area dropped a bit more than 100 thousand hectares, from 838 thousand hectares in 1888 to 715 thousand hectares in 1937. Other crops, such as pulses, feed root crops, and beans, generally yielded area to wheat and barley over this period.

These trends were the result of several long-run forces. On the demand side there was a shift from rye to wheat bread as per capita income rose in Germany following the industrial take-off of the late 19th century. There was also a shift in the German diet toward meat

associated with per capita income growth which created demand expansion for barley and wheat as feeds. New technology used in livestock feeding placed more reliance on higher quality feeds which again favored barley and wheat. The downtrend in oats reflected the increased mechanization of German agriculture. Oat area expanded until the First World War and the area downtrend really appeared in the 1920's and 1930's. The late 19th and early 20th centuries were also a period of rapid biological technical change in German agriculture which affected the various crops in different degrees. Yields for all grains and for potatoes rose. Wheat remained the highest yielding grain and by the late 1930's had slightly increased its advantage over barley. Rye and oat yields rose faster than did wheat and barley yields, yet remained lower. Potato yields roughly doubled.

Comparing the area in wheat for the regions that would become East and West Germany shows differences between the trends for the years leading up to the First World War and those afterward. The trends in the two regions from 1888 to 1914 were the same for barley, rye, oats, and potatoes so that the area ratios for the two regions, while fluctuating annually, showed no trend. However, the ratio of wheat area in what would become East and West Germany showed a positive trend. That is, East German wheat area was expanding relative to West German wheat area. After the First World War the East to West German area ratios for all of the grains shifted upward but showed no trend during the 1930's. The regional relationship for potatoes was basically unchanged. Thus, over the period as a whole grain area in the regions that would become East Germany expanded relative to that in the future West Germany.

Interpreting yield differences in the two regions is made difficult by their annual variability as well as by their trends due to technical progress. East and West German rye yields from 1888 to 1937 showed no observable difference and the trend was the same. Oat yields in the two regions were the same in the late 19th century. Data from 1900 to 1914 show that East German oat yields lay above West German yields for each year. The late 1920's and the 1930's was a period where great variability occurred in both regions. In most instances the eastern oat yield was higher. East German wheat and barley yields consistently exceeded West German yields with the advantage increasing until the First World War, but after the war the eastern advantage narrowed. For potato yields the regional data are very similar with a slight advantage in the eastern region after the turn of the century.

Statistical tests confirm these observations. For the 1888 to 1914 period mean yields in the areas that became East Germany were greater for wheat and barley and these differences are statistically significant at a 0.5 percent rejection criterion. The mean eastern potato and oat yields are higher, but the differences are not statistically significant. For rye, the areas of western Germany have a greater mean, but the difference is not significant. The results from the statistical tests for the 1928-1937 period match those for the other data.

For sugar beets and rapeseed only regional data for the interwar years were obtained. Sugar beet area in the regions that would roughly match East Germany fell from 1928 through 1932. Thereafter, area rose and by 1937 was close to the 1928 level. Rapeseed area which was only 4 thousand hectares also fell to 1932 and 1933. The National Socialist government adopted an autarkic policy and subsidized rapeseed production. In 1936 and 1937, area reached 20 thousand and 18 thousand hectares, respectively. Compared to the areas which became West Germany, East German sugar beet area was fluctuating greatly from 1928-1937 with a

downward trend, yet the east remained the dominant region. The ratio of East to West German rapeseed area from 1930-1937 was more stable and rising. Yields for both crops in both regions were rising. There was little difference between East and West German rapeseed yields and the slightly higher mean yield for the future East Germany was not statistically significant. For sugar beets the areas in the future West Germany had a yield advantage on average. At a very high level of significance no significant difference was found, but a significant difference did exist at a lower level (10 percent).

For other crops only regional hay data were available over the 1888-1937 period. The hay area in the future East Germany was stable from 1888-1934 at 1030-1050 thousand hectares. After 1934 area fell slightly to 975 thousand hectares in 1937. In the regions that would become West Germany hay area expanded slightly from 1888 to 1914, from 3.18 to 3.28 million hectares. From 1928 to 1937 western hay area rose from 3.4 to nearly 3.7 million hectares. Hay yields in eastern Germany rose from 1888 into the first decade of the 20th century and then stabilized until the First World War. Yields in the late 1920's were below the pre-war level but recovered to old levels in the 1930's. Western hay yields were higher in 1888 and showed expansion to World War I. They were also lower in the late 1920's but by the 1930's had recovered to pre-war levels. Statistical tests for the 1888-1914 period show a significant mean yield advantage for the west existed. Tests on the later data show no significant advantage existed at an extremely high confidence level, but at a weaker 10 percent level a difference was found.

Data for alfalfa and clover -- 1930-1937 -- show that area fell in both regions with the overall percent decline in the west slightly greater. Yields in the west were on average greater and the difference was statistically significant at a weaker confidence level -- 10 percent.

Cattle numbers in East Germany expanded from around 2.6 million head in 1883 to 3.6 million in 1914. In 1928, the population was about 3.3 million. It rose back to the 3.6 million level in 1933 and 1934, but then fell to 3.2 million head just before the Second World War. Compared to the west, the cattle population was stable until the middle 1930's when the western population stabilized while that in the east fell.

The trend in the swine population for eastern Germany was similar to that for cattle -- an expansion prior to WWI, recovery after the war with a peak in 1933 followed by a decline just before WWII. The swine population in the east on the eve of the Second World War was roughly the same as the population in 1914. Compared to the western population, the east lost ground from 1883 to 1914. During the build-up to 1933 it recovered that loss but surrendered it later in the decade.

Data for poultry also suggest a relatively weak performance by the areas that would become East Germany. Three data points were found for the pre-WWI years -- 1900, 1907, and 1912. Total bird numbers rose from 13.9 million to 17.3 million a percentage increase slightly less than that for the west. From 1928 to 1933 eastern bird numbers rose, but fell afterward to show a decline for the period overall. Populations in the west rose from 1928 to 1937 so that after the middle 1930's the share of poultry in the east was falling.

Combining the data for the various commodities and adjusting for the relative size of the regions suggests that the agriculture of the areas that would become East Germany was more heavily weighted toward crops than the agriculture of the west. Of Germany in 1914 -- including regions lost -- what became West Germany constituted 47 percent while the future East Germany was 20 percent. In cattle the western part had from 50-57 percent while the areas of the future East Germany had but 16 percent. For swine numbers before WWI a relative advantage for the eastern part had shifted to match relative size by 1914. In poultry, the west had 53 percent versus 21 percent in the future Democratic Republic. With some modifications these livestock patterns continued after the war. Into the middle 1930's the east gained share in swine but lost that share in the late 1930's. The underrepresentation of eastern Germany in cattle was also reflected in the distribution of forage area. For field crops the region held a share that reflected its relative size or exceeded it. For rye, oats, potatoes, and to some extent barley the shares of area in eastern Germany before 1914 were larger than relative size would suggest. For wheat it was underrepresented, but it was gaining share. In the interwar years the area ratios for crops of the future Democratic Republic had generally risen and were comparatively high for rye, wheat, barley, potatoes, and oats. In the case of sugar beets, although the region contained 23.5 percent of interwar Germany, it had 40-43 percent of the sugar beet area. Thus, while the entire spectrum of agricultural commodities were produced the relative emphasis of the region was on grains, potatoes, and sugar beets.

The Production Structure of East Germany

The purpose of reviewing the production structure of pre-war Germany is to determine whether shifts in that pattern occurred under the central planning of the communist government. This part examines briefly the post-war trends in East German commodity outputs. It also relates those trends to the trends that simultaneously occurred in West Germany. The argument made is that under central planning the agricultural sector in East Germany was forced to develop a production structure that renounced its traditional patterns.

The point of departure for the discussion is a summary of the production policy of the government of the German Democratic Republic. A central policy objective was autarky, both nationally and regionally within the Democratic Republic (Schrader, Nr. 171/72, p. 50). While some goods, such as tropical products, could not be produced and would need to be imported, agriculture was expected to cover the basic food needs of the population. Thus, the potential gains from international trade were rejected. This policy was even pursued down to the regional level so that potential gains in regional production specialization within the country were wasted.

The central planning apparatus of farm level production plans, compulsory output deliveries, and state control of inputs and investment allocations was the instrument to implement the autarky policy. An additional feature of this policy was very high producer prices altered to encourage the production of the desired goods and subsidized prices for basic foods. Enterprise budgets were soft so that losses could passed through the system to be covered by the government. Profits were diverted to the state through taxes. Economies of scale, size, and scope in production were to be captured by socialist enterprises. First, through collectivization and creation of state farms, later via horizontal and vertical integration, and finally by enterprise specialization in crop or livestock production. In concept, such scale economies and

specialization would lead to production efficiencies whereby producer prices could fall toward the subsidized levels paid by consumers.

An additional feature of the policy environment was the favorable treatment of livestock. Livestock self-sufficiency was a high priority and relative prices for livestock commodities were managed to encourage output. Compared to West German livestock - grain price ratios, East German producer price ratios were extremely high. The consequences of this pro-livestock policy combined with regional autarky policy meant a regional diffusion of livestock production within the Democratic Republic and its separation from regional patterns based on natural advantages (Agra-Europe, 38/90, Dokumentation p. 9). This would have important consequences when EC policies were introduced.

The instruments used and the plans set created a shift in crop area over the 1949 to 1987 period. Wheat area rose from 469 thousand hectares in 1949 to 777 thousand hectares in 1989 (Data used are from Statistisches Jahrbuch der Deutschen Demokratischen Repubik; Statistisches Jahrbuch für die Bundesrepublik Deutschland; U.S. Department of Agriculture). Barley area rose into the late 1970's -- from 253 thousand hectares in 1949 to over 1 million in 1978 -- and then fell to around 890 thousand hectares. As East Germany was deficient in protein feeds, fats, and oils, rapeseed area expanded some -- from 67 thousand hectares in 1949 to 148 thousand in 1989. Field crops losing area were rye (from 1.3 million hectares to 620 thousand), oats (530 to 143 thousand hectares), and potatoes (813 thousand to 431 thousand hectares). Sugar beet area remained stable as it varied from 192 thousand hectares to 269 thousand with no clear trend.

Among the various crops the area trends for East Germany differed greatly from those trends occurring in West Germany under the Common Agricultural Policy of the European Community and its West German predecessor. The ratios of East to West German areas for wheat and barley had similar patterns. During the 1950's these ratios fell because East German area was relatively stable. With the completion of the collectivization process early in 1960, the ratios of East to West German wheat and barley areas began a sustained climb lasting to 1989. Nevertheless, except for three years-- 1969, 1976, 1977 -- the ratio for barley lay below the interwar relationship. For wheat, all years had ratios below the interwar years. Thus, for wheat and barley the area ratios in the late 1980's were very similar to those before the First World War and were below the interwar period.

Despite much different trends in East German area for oats and sugar beets, the changes in the East to West German area ratios were similar. With East German sugar beet area stagnate and West German area expanding, the pre-war pattern of a falling area ratio continued. Whereas in 1950 East German sugar beet area exceeded West German area by more than 15 percent, by the late 1980's East German area was less than 60 percent of the area in the Federal Republic. This adjustment was partly due to the price support system offered to sugar in the west and partly a result of more rapid technological change in the west. The ratio of oat areas in the two regions was stable before the Second World War, but fell from 1950 to 1979. Since then it rose, but remained well below the earlier levels.

Although East German potato and rye area fell sharply since 1949, the rate of decline was far less than that for West Germany. Thus, the East to West area ratio climbed greatly.

For rye, the pre-war ratio fluctuated between 70 and 77 percent with no observable trend. That range basically held true until the late 1960's when it began to climb. By the early 1980's East Germany had around 60 percent more area in rye than did West Germany. In the 1980's the ratio fell some, and by 1990 the east had only 40 percent more rye hectares than did the west. The relationship shift between the regions for potatoes was even more extreme. From 1888 to 1937 the area ratio held below 0.7. In the 1950's it lay between 0.7 and 0.75. Following 1961 the ratio began a sustained rise -- exceeding 1.0 in 1969, 2.0 in 1984, and reaching 2.3 in 1988. Thus, at the end of the period of central planning, the Democratic Republic with its autarkic policy and its policy of subsidizing basic foodstuffs had more than twice the area in potatoes than did the Federal Republic.

The situation in rapeseed was also shifting radically and reflected the problems that East Germany was having with central planning. East Germany was a deficit region in protein meals, in vegetable fats, and in vegetable oils. This conflicted with its autarkic policy as the supplies needed for its livestock production as well as the population's fat and oil needs had to be imported from the west using hard currency. Correspondingly rapeseed area expanded. Yet that expansion was limited by the crushing capacity of the processing industry. Thus, East Germany was self-sufficient in rapeseed production due to this capacity limit, but deficient in oilseed products which had to be imported in large volumes from non-socialist countries using scarce hard currency. Relative to the expansion seen in the west, the increased area in the Democratic Republic was small. In the initial post-war years West Germany sought virtually all its supplies of oilseeds, protein meals, vegetable fats and oils on the world market and so the small East German area was many times the level of the west. A faster rate of area expansion in West Germany after 1955 due to price supports and technical change reduced the area ratio. The ratio seen in the 1930's reemerged in the early 1980's and the continued rapid expansion in the west under increased EC price supports continued to erode the relative East German position.

In countries like East Germany where the total land available is relatively constant -- or actually falling -- yield growth achieved via technical change is critical to expanded output. Yield growth not only expands output directly, but also allows shifts in area among crops. In the case of grains, East German yields grew in the post-war period. Wheat yields in the middle 1950's lay around 3 tons per hectare and by the middle 1980's were consistently in the 5.5 tons per hectare range. A similar rise occurred for barley -- from 2.5-3.0 tons per hectare in the 1950's to 4.5-5.0 tons in the mid 1980's. Rye and oat yields also increased but by less. Rye yields went from around 2 tons per hectare to 3.5 tons. Oat yields rose from 2.0-2.5 tons in the 1950's to 3.5-4.5 tons in the 1980's.

The gains in East German grain yields lagged behind those of West Germany so that in contrast to the pre-war pattern East German yields were lower. For wheat the level of yields in the two Germanies were similar until 1970 when a noticeable advantage in favor of the west began to appear. For barley the gap was less clear and in any case was not noticeable until the middle 1970's. Even so the data back to 1888 showed a consistent advantage for East Germany in the yields of these two crops. For rye and oats pre-war yields in the two regions were roughly the same, but after the war the west had a consistent advantage -- considerably so for rye. The same pattern occurred for rapeseed.

Even more serious yield growth problems occurred for potatoes and sugar beets. Potato yields in East Germany moved higher -- noticeably in the 1980's -- yet in general were in the same range as those of the interwar years. West German potato yields in contrast always lay above pre-war levels and a positive trend was apparent. Sugar beets in East Germany experienced no yield increase after the Second World War and were comparable to the levels obtained in the interwar years. Yields in West Germany, which during the 1930's exceeded those in East Germany, moved considerably higher after the war. By the end of the 1980's West German yields for sugar beets were 50-75 percent above East German yields.

There were several sources for the problems encountered in raising East German yields. One problem was slowness in the development and adoption of new varieties which lagged behind the technology available in the west. This slowness has been attributed in part to the lack of competition facing seed producers under socialism as well as to the need to improve varieties suited to the harsher conditions of the east. Lack of tonnage of fertilizers, herbicides, fungicides and insecticides was not a cause as applications per hectare were well above western levels. However, quality was low, application dosages inexact, and timeliness poor so that the overall effectiveness of chemical use was low. The level of mechanization was high, but not always appropriately used and often the machinery was antiquated. Lack of timely field operations and excessively heavy machinery led to soil compaction problems and yield losses. Much of the problem with yields lay in the excessive size of units, in specialization of inflexible labor, a weak incentive system, in high transaction costs, and in communication and coordination problems. That is, system related failures in planning and in the organization of units to execute the plans assigned hampered the agricultural performance of East Germany.

As noted one key policy objective lay in favoring the development of self-sufficiency in livestock production. This objective was met and even exceeded so that East Germany became a livestock exporter. The total cattle population rose from 2.8 million head in 1946 to 5.7 million by 1989. Milk cows increased rapidly after the war from 1.4 million to 2.1 million in 1955 and then stabilized at that level so that over time there was increased emphasis on beef production. Swine numbers recovered quickly after the war -- reaching 5.7 million in 1950. Numbers climbed to 13.1 million in 1983 before falling back to 12 million in 1989. Poultry numbers rose from 22.7 million birds in 1950 to 54.4 million in 1981 and stabilized at 49-50 million afterwards.

The development of livestock in East Germany compared to West Germany after the Second World War was remarkably different from the historical relationship. Whereas before the war the ratio of East German herds to West German herds was stable or falling, after the war East Germany was expanding compared to West Germany. In 1948, the ratio of East German to West German cattle populations was 0.27 -- the historical ratio was 0.29-0.3. An upward trend ensued and the ratio peaked at 0.39 in 1974. Since that time it has fluctuated between 0.37 and 0.38. Before the Second World War the East to West German ratio for swine tended to exhibit a downtrend. As with cattle, the 1948 ratio of 0.39 was in line with the historical level. The post-war pattern for the swine ratio in East to West Germany differed from that of cattle. The ratio climbed rapidly to nearly 0.7 in 1952 and then fell. The post-war low was reached in 1970 at 0.46 -- roughly the 1892 level which was historically still high. During the 1970-1975 period it again climbed to 0.58 and afterward fluctuated between 0.52 and 0.57. Thus, during the post-war period the loss of share relative to western Germany experienced in

the 1883-1914 period was regained. Poultry exhibited an entirely different pattern. Only twice -- 1958 and 1966 -- did the East German bird population fall to the historical relationship with the population in the west. The post-war ratio showed a cycle of a trough in the 1950's, a peak in 1960 followed by a trough in 1966. After that time the ratio has been rising with a value of around 0.65 in the 1980's versus a historical ratio of 0.4.

Comparing these trends with those of the pre-WWII years suggests that under central planning the East German agricultural sector was pushed in a different direction. Before the war the sector was crop dominated and the output mix was shifting further in favor of crops. The region was the dominant sugar beet producer. Wheat and barley were expanding at a faster rate than in the west. After the Second World War there was a noticeable shift in East Germany towards livestock. Absolute numbers were rising as were numbers relative to the expansion in the west. Wheat and barley production in East Germany expanded but were behind the levels relative to the west when viewed in the context of the interwar years -- more like the early 20th century. Production of oats was in decline and at a faster rate than in West Germany. Rapeseed production rose but lagged behind the growth in the west. Stagnate sugar beet area and yields in East Germany meant that the region's once dominant position over the west disappeared. While rye and potato area fell in East Germany, the rate of contraction was slower than in the west. Thus, when the communist regime collapsed the agricultural sector appears to have been producing an inappropriate mix of too much livestock, too much rye and potatoes, with too little wheat, barley, rapeseed, and sugar beets.

Eastern German Agriculture in a New Environment

The previous section notes the shift in the East German production structure between the pre-war and post-war years. Yet the reunification of Germany does not guarantee that the pre-war patterns will reemerge because the environment is different. Since the Second World War agricultural technology has changed and the relationships between output mix and natural conditions has been altered. Also the agricultural policy environment has changed as German policy has been replaced by EC policy.

The purpose of this section is to present the changes in the eastern German output mix occurring since 1989 as market forces and EC rules are introduced and to discuss why those changes occurred. This section is divided into two parts. The first is a straightforward description of the differences in production structure in 1989, 1990, and 1991. The second part explains why these changes occurred. Understanding the motives for the changes seen provides the foundation for looking into the production structure of the future.

A Review of 1989, 1990, and 1991

Each of the years 1989, 1990, and 1991 comprised different political, social, and economic characteristics which must be considered. The year 1989 was basically one of the central planning regime. The actual political change occurred in early November following a few months of turmoil -- largely reflected in street demonstrations and labor emigration via other

nations. During 1990 the future situation was unclear and in a state of fluctuation. Originally East German elections were scheduled for early May, then were quickly shifted to March as the political situation deteriorated. The treaty of economic and monetary union was crafted quickly and implemented July 1, 1990. While much of the EC agricultural policy was transferred to East Germany, special transition rules through March 1991 were introduced. Given the political situation that summer the operating assumption was that East Germany would continue to exist for an uncertain length of time. Actual events were that the Democratic Republic disappeared on October 3, 1990 --some three months after economic union. Thus, 1991 was the first year of a reunited German agricultural sector, yet there continued to be special adjustment assistance and investment aids for the region as well as many unresolved issues. Most of the uncertainty in agriculture focused on the procedures for dissolving collective agriculture, on privatizing state assets, and on ownership claims. It should also be recalled that the country as a whole was in the process of unprecedented change and that the problems faced by agriculture were mirrored in every sector. Hence, none of the three years can be regarded as normal.

Although the figures in the tables are preliminary, the short-run directions of the shifts in the production pattern for eastern Germany are clear. Total cropland in 1990 was roughly the same as in 1989 while livestock populations fell sharply. Because the cropland allocation decision was set in the fall of 1989 and the spring of 1990 prior to economic union the lack of adjustment in 1990 is not surprising. By the fall of 1990 and the spring of 1991 the consequences of economic and political union were being felt and total cropland began to fall, mostly due to the introduction of set-aside. Livestock inventories continued to fall sharply so that there was a noticeable shift in the production structure away from livestock.

Within the crops the production structure changed. Between 1989 and 1990 grain area expanded slightly -- about 1 percent (table 1). Wheat was the major grain losing area in the 1990 crop year -- a loss of just over 2 percent. Other grains losing area included oats and summer mixed grains. The adjustments from 1990 to 1991 were different. Grain area in total fell -- 14 percent. Barley area contracted slightly, 3 percent. Wheat area recovered its earlier loss and even rose above the 1989 level. Rye area in 1991 fell sharply, 47 percent. Sugar beet area fell 7 percent from 1989 to 1990 and then in 1991 a large drop of 18 percent occurred. With the new economic environment potato area entered into a severe area contraction -- 22 percent down in 1990 and a 66 percent further loss in 1991. Field fodder crops initially expanded area, but with the decline in livestock area fell sharply in 1991. The crops with the largest area gains in 1990 and 1991 were rapeseed -- stable from 1989 to 1990 and a 121 percent increase in 1991 -- and other crops, such as corn, sunflower seed, and flaxseed. Thus, the crop area mix shifted in favor of wheat, barley, oilseeds, and against rye, oats, sugar beets, and potatoes.

The area adjustments alone do not explain the shifts in production structure because the comparatively low crop yields seen for East Germany were expected to rise quickly. The crop production figures shown in table 1 show that this expected yield increase was generally occurring. Although wheat area fell slightly from 1989 to 1990, output rose nearly 20 percent. The expansion in wheat area for 1991 with continued yield gains raised production another 13 percent. A more extreme case occurred for sugar beets where the 7 percent area contraction from 1989 to 1990 was associated with a 13 percent rise in output. Between 1989 and 1990

Table 1: Crop Area and Production in Eastern Germany, 1989-1991

Crop	Area			Production		
	1989	1990	1991*	1989	1990	1991*
	-- thd hectares --			-- thd metric tons --		
Grain total	2459	2478	2131	10814	11833	10150
Wheat	777	759	789	3477	4189	4721
Barley	895	920	891	4683	4797	4980
Rye	624	643	342	2103	2044	1445
Sugar Beets	217	202	165	6220	7056	6060
Rapeseed	148	149	329	419	368	947
Potatoes	431	337	116	9167	6806	2825
Field Fodder	1081	1098	829			

* Preliminary
Sources: Böse and Welschof, p. 2.
Heberle and Kreitmair, pp. 64-66.

Table 2: Yield Developments for Major Crops in Western and Eastern Germany, 1985-1991

Crop	1985-1990 Average		1990		1991*	
	West	East	West	East	West	East
	-- tons per hectare --					
Grains	5.47	4.51	5.79	4.72	6.23	5.47
Wheat	6.34	5.18	6.66	5.52	7.15	5.99
Rye	4.34	3.37	4.71	3.18	5.07	4.22
Barley	5.09	4.88	5.43	5.22	5.78	5.59
Oats	4.39	3.93	4.53	4.26	5.03	4.38
Rapeseed	3.11	2.71	3.03	2.46	3.20	2.88
Potatoes	35.49	23.95	34.27	20.19	31.92	24.32
Sugar Beets	52.53	31.43	57.43	34.89	50.04	36.71

* Preliminary
Source: Heberle and Kreitmair, pp. 64-66.

barley area rose more than did output while rapeseed and rye output fell despite the rise in area. This was due to an abnormally dry conditions. Data for rye for 1991 shows a yield improvement occurred as 1991 yields were above the 1985 - 1990 average (table 2). Yield problems continued for rapeseed as the yield recovered only to slightly above the 1985 - 1990 average for East Germany -- again 1991 was unusually dry. Thus, for the crop production figures shown in table 1 there was a shift in the production mix toward wheat, barley, and rapeseed. Sugar beet production varied in the same range, while potato and rye output fell.

Given the annual variation in yields, the few observations provide very limited information upon which to anticipate the future. Indeed the late summer of 1991 was dry while the spring and early summer had been cool. Comparatively little moisture had also been received in major areas in 1990. Table 2 shows the different yield developments for major crops and compares them with western Germany. For eastern Germany most grain yields rose considerably through 1991 while rapeseed and potato yields showed slight gains. The yield for total grains in 1991 was just over 21 percent greater than the 1985 - 1990 average. The largest percentage gain was made by rye yields, followed by wheat, barley, and oats. Sugar beet yields which had not risen significantly since the Second World War experienced nearly a 17 percent increase. Following the poor performance in 1990 due to weather rapeseed yields in 1991 recovered to record a gain of just over 6 percent. Yield growth for potatoes was slow after the Second World War and this situation continued as compared to the 1985 - 1990 average the 1991 yield was 1.5 percent greater.

As noted, before the Second World War eastern yields were at or exceeded western yields, except for sugar beets, and that in the post-war years the relationship shifted against the east. This situation is reflected in the 1985 - 1990 average figures. By the 1990 crop season the disadvantage for the east had narrowed for all crops, with the exception of oats, due to a more rapid rise in yields in eastern Germany with economic reform. The most rapid narrowing of the gap occurred for sugar beets and for potatoes, in that order. These were the crops in which the post-war yield developments had lagged the most. Yet an examination of the data shows that compared to the 1985 - 1990 average western yields were down in 1991 so that the extent of closing the gap may be overstated. The west-east yield gap for rye also narrowed sharply between the two periods while the gaps for the other crops showed more modest declines. Nevertheless, a substantial gap remained for most crops, outside of barley, which the pre-war data suggests should not be the case. Hence, a further narrowing of the gap can be expected.

The state differences in yields reflected the predominate natural conditions (table 3). For grains, Brandenburg with its sandy soils had the lowest yield in each year. Mecklenburg-Pomerania and Saxony-Anhalt also have large areas with poor soils so yields tended to be below average. Because Saxony-Anhalt contains richer soil on average the 1989 relationship to Mecklenburg was unusual and in the subsequent years the grain yield for Saxony-Anhalt lay above that for Mecklenburg-Pomerania. Above average yields were recorded consistently for the more southern states with their better soil types. A somewhat different pattern appeared for oilseeds where Mecklenburg-Pomerania dominated. This reflected the fertile coastal region. Again Saxony had a consistently strong yield performance in these three years. Saxony-Anhalt showed more yield variation than did other regions as its rainfall in some areas is strongly

Table 3: Eastern German Grain and Oilseed Yields by State, 1989-1991

Year	Mecklenbg Pomerania	Brandenbg	Saxony Anhalt	Saxony	Thuringia	Average
			-- tone per hectare --			
Grains:						
1989	4.63	3.52	4.27	5.11	4.89	4.40
1990	4.66	3.70	4.72	5.77	5.48	4.72
1991[1]	5.67	4.66	5.73	5.60	5.68	5.46
Oilseeds:						
1989	3.28	2.20	1.64	2.55	2.21	2.70
1990	2.67	2.07	1.77	2.30	2.08	2.35
1991[1,2]	2.94	2.61	2.88	2.88	2.18	2.75

[1] Estimated in the summer of 1991 and differs from date in Table 2.
[2] Only rapeseed so implies a small overestimate.
Source: Isermeyer, p. 295.

influenced by the Harz mountains. In the first two years it suffered the lowest yields, while the 1991 expected yield was above average.

The livestock inventory adjustments in 1990 and 1991 were large and negative (table 4). In the first year cattle numbers fell 14 percent -- milk cows, 16 percent. Swine numbers were 27 percent lower, layers down 28 percent, and sheep 44 percent. The decline in cattle numbers slowed from 1990 to 1991, but that for milk cows continued to be large -- 16.9 percent. The reductions in populations of swine and layers between 1990 and 1991 also continued to be strong -- 25.6 percent and 16.2 percent, respectively. Sheep numbers continued to fall, but at a slower rate.

The liquidation of milk cows was reflected in the milk deliveries to eastern German processors and cheese production figures (table 5). From 1989 to 1990 milk deliveries fell almost 7 percent with the reduction concentrated in the period after economic union. Third quarter deliveries were down 14 percent and fourth quarter deliveries more than 20 percent. The continued decline in milk cows into 1991 caused a 31 percent decline in 1991 milk deliveries. The quarterly cheese production figures showed weakness as early as the first quarter of 1990, but as with milk deliveries the decline after July 1990 was very severe. For the year 1990 the cheese output decline was 43 percent. That decline also continued into 1991 -- 57 percent -- so that compared to 1989 cheese output in 1991 was 76 percent lower.

The livestock inventory liquidation also affected meat outputs with the differing impacts reflecting characteristics of the livestock type (table 6). Herd reductions meant an increase in meat output followed by a decline as the reduced numbers worked through the marketing system. For animal types with short production cycles the drop in animal numbers was quickly reflected in meat output declines. Poultry have the shortest production cycle and output fell in 1990 by 16 percent for poultry meat and 15 percent for eggs. Pork output due to the longer cycle for swine fell 2 percent. The longest production cycle is for cattle and the herd liquidation resulted in an increase of 30 percent for 1990.

Causes of the Adjustments Underway

The adjustments described were the result of the interaction of several forces. These forces can be categorized into those which affected all commodities and those which were specific to a particular commodity or group of commodities. This part discusses the influences of these forces on the eastern German agricultural production structure.

One force behind the observed adjustments was the poor condition of the agricultural sector at the end of the communist period. Enterprises -- collective and state farms -- were poorly organized and run. The size of units was considered excessive with high transaction costs and this contributed to inefficiency. The enterprises were more like rural communities than farms in a western sense and hence had many of the non-agricultural functions of a community. The enterprises were overstaffed with labor and that labor lacked incentives for efficiency gains. Furthermore the labor was specialized by task and could not be shifted among activities. Capital on these enterprises was also inadequate. Investment in the sector had been neglected during the 1980's in an effort to save foreign exchange and to limit international debt. The capital that

Table 4: Livestock Populations in Eastern Germany, 1989-1991

Livestock Type	1989	1990	1991*
		-- thd. head --	
Cattle	5724	4927	4750
Milk Cows	2000	1685	1400
Swine	12013	8742	6500
Sheep	2603	1448	1300
Poultry	49270		
Layers	24866	17934	15020

* Estimates in the summer of 1991.
Source: Böse and Welschof. p. 3.

Table 5: Eastern German Milk Deliveries and Cheese Production by Quarter, 1989-1991

Quarter	Milk Deliveries to Dairies			Cheese Production		
	1989[1]	1990[1]	1991	1989[1]	1990[1]	1991
			-- thd. tons --			
1	1788.4	1888.8		61.1	56.3	
2	2210.6	2223.4	} 2810[2]	63.6	49.5	
3	2002.5	1722.6		66.7	20.4	
4	1774.7	1412.8	} 2176.3	57.0	12.8	
Total	7776.2	7247.6	4986.3[3]	242.9	139.1	59.5[3]

[1] Lösch, p. 48.
[2] Based on Agra-Europe, 48/91, Kurzmeldungen, p. 5.
[3] Based on Agra-Europe, 50/91, Markt + Meinung p. 13.

Table 6: Adjustments in Meat and Egg Output in Eastern Germany, 1989 and 1990.

Commodity	Output		Percent Change
	1989	1990	
	-- thd tons --		percent
Beef/Veal	402	522	30
Pork	1401	1377	-2
Sheep/Goat	20	31	55
Poultry	178	150	-16
Eggs	354	300	-15

Source: Böse and Welschof, p. 3.

existed was old and labor intensive which contributed to low productivity. Investment that had been made was often based on ideological grounds in terms of location and type. For example, milk facilities had to be of a large size to receive investment based on supposed economies of scale. Those proposing a smaller unit were denied investment. Successful enterprises were required to turn over much of the profit to the state which then diverted the funds to weaker units, thus, precluding their investment . Many enterprises at the end of the communist period were burdened with old debts and unresolved ownership claims on their assets which hindered new investment. Farm level analysis of collective enterprises suggested losses for most farms under EC market conditions without major changes in input allocation and production structure (Weinschenk, et al, p. 4).

This situation resulted in attempts by farms to cuts costs, particularly labor costs. Because the old, labor-intensive livestock facilities were associated with higher labor costs than were crop operations there was a tendency to reduce livestock output faster (Weinschenk, et al, p. 4). Furthermore, the existing large livestock facilities could not as easily be privatized through subdivision so there was a tendency to curtail operations of entire barns with large numbers. There was also a tendency to downsize operations to reduce average costs, especially transaction costs. Non-revenue producing activities associated with community functions were discontinued. Again, relatively labor-intensive operations, such as livestock and potatoes, were curtailed. The financial problems of the enterprises also created a desire to generate liquidity through livestock inventory reductions, participation in land set-aside, and leasing or sale of the better land to outside interests.

Another general factor facing the sector early was the difficulty of finding market outlets. One reason was the rejection of eastern German goods by consumers (Böse, p. 3). The first weeks of economic union saw a massive shift of consumer demand to western goods -- even when homogeneous. This was compounded by the defective marketing and processing sector. The livestock processing sector suffered from excess labor and old, worn-out, labor intensive facilities. Few plants were able to meet the sanitary conditions of the EC. Lack of quality and variety in livestock products was a major problem for eastern German producers. Thus, consumers turned to the now available western goods. By the spring of 1991 the demand for eastern goods by eastern Germans had begun to recover, yet eastern German products continued to have a negative market image for many western German consumers.

A series of general problems for eastern German agriculture stemmed from the macroeconomic forces at work, particularly the economic union with the west. One problem was the linkage between the western and eastern labor markets and the way the linkage was handled (Sinn and Sinn, pp. 140-148). With a joint labor market wage levels in the east would be expected to rise and those in the west to fall due to labor movements until an equilibrium was reached. With flexible wages, factor productivity and employment in both eastern and western Germany would remain in balance. The actual situation was that wages were not flexible downward and labor unions were allowed to negotiate large wage increases in eastern Germany virtually unopposed, in part with the support of western unions. Western unions had no incentive to encourage the development of a low wage structure in the east which was more appropriate to the productivity of that labor. Thus, wage increases in the east outstripped any conceivable productivity gains. To be competitive, labor costs had to be reduced. This could be done in the long-run through improved productivity arising from new capital investment,

technical change, and retraining. In the short-run it meant releasing labor. Agriculture was affected along with other sectors. Discussions with some farmers indicated that wage costs between fall 1989 and spring 1991 had more than doubled. Farmers also consistently reported labor reductions of around one-half --largely by discontinuing labor intensive operations like livestock.

Economic union also resulted in an implicitly overvalued currency for eastern Germany. In parallel markets before economic union, the eastern mark traded at a substantial discount. Currency conversion occurred at a two to one rate with major exclusions, including wages and prices, where a one to one rate was adopted. This in effect was an export tax and an import subsidy. The relative price of tradeable goods fell and these sectors were squeezed further due to rising wages. This also meant a fall in the rental rate for capital which slowed the needed new investment. The output composition of the economy shifted against traded goods as well as against labor-intensive goods. Thus, agricultural production was hurt in general and within the sector livestock output was damaged more than crops output because it was relatively more labor intensive. A further impact was that old debts were also converted at full value while output prices were pushed lower, thereby, squeezing farms with old debts incurred in the communist period.

Another feature of the economic union was the transfer of EC market rules to eastern Germany. While EC commodity support prices meant that the sector was spared the full adjustment to world prices, EC producer prices were nevertheless well below East German levels (Schrader, Die Weltwirtschaft, p. 136). West German prices were 30-60 percent below those of East Germany so that the immediate effect of adopting western prices in conjunction with the currency conversion would be a halving of income for the enterprises without other adjustments. Former profits of 2000 marks per hectare were expected to convert into equivalent sized losses (Frankfurter Allgemeine Zeitung, February 20, 1990, p. 15). Thus, there was a serious price-cost squeeze for enterprises (Agra-Europe, 29/92, Länderberichte p. 26). This adjustment was not commodity neutral. Based on 1988, East German crop prices lay 1.9 times the western level and livestock prices 2.8 times those in the west (Böse, p. 3). These differences reflected both the East German autarky policy as well as the pro-livestock bias of policy. Adjustments to EC prices resulted in a relative price shift away from livestock.

Thus, the sector burdened with an inefficient organization, antiquated technology, low productivity, a worn-out capital stock, large debts, and unclear ownership claims was faced with a serious price-cost squeeze. This resulted from rising labor costs, an inappropriate currency conversion, and from the transfer of EC policy. Immediately on economic union there was a rejection of eastern produced goods by consumers. The effect was to lower output in general for the sector and to shift it away from livestock in favor of crops.

For individual commodities there were specific forces which influenced the adjustment process. In the case of sugar beets the pre-war data showed that the areas that became East Germany were the major sugar beet producing regions. This suggests that eastern Germany might have expanded sugar beet area, but the observed adjustment was a contraction of area. A major cause of this adjustment was the introduction of the EC sugar production quota system into eastern Germany. The production quota was based on the 1989 level for East Germany and was set initially at 847000 tons or about a 20 percent increase (Schrader, Nr. 171/172, p. 20).

Quotas in subsequent years were to be divided according to a 1984/85-1988/89 reference period. As noted East German sugar beet yields did not rise in the post-war period and the 1989 yield was roughly the same as the 1932 yield. The expectation was that due to the introduction of western technology and improvements in farm efficiency sugar beet yields would rise quickly under market forces. Thus, the quota level would require an area reduction (Schrader, Nr. 171/172 , p. 50). This indeed happened as seen in tables 1 and 2. The greatest post-war yield for East Germany was 35 tons per hectare in 1987. That level was nearly matched in 1990/91 and yields continued to expand in 1991/92. With the division of the quota regions with the strongest yield performance were most severely affected.

Several forces operated to favor other crops. Crops had a comparatively favorable starting position in terms of costs and returns (Böse and Welschof, p. 1). One reason for the expectation that crops would more quickly become competitive was that labor costs were less difficult to reduce because of labor-saving machinery (Weinschenk, et al, p. 4). The machinery was often old, but was useful and its replacement could be stretched over several years (Schrader, Nr. 171/172 p. 20). Machinery could also be divided relatively easily among collective members and investment aids programs facilitated purchase of new equipment.

While the liquidation of enterprises led to forced sales which pressured grain markets, steps were taken to ease the pressure (Fock and Kreitmair, p. 89), As noted crop prices did not have to fall as much as did livestock prices to reach EC support levels. Intervention purchases and export subsidies were quickly introduced to support the market. An annual set-aside program with a premium of 500-750 DM per hectare was introduced. Unlike the situation in other parts of the European Community potato area could be set-aside which gave support to crop prices (Schrader, Nr. 171/172, p. 21). The level of the set-aside premiums relative to costs and the need for liquidity by farms meant that participation in the program was very attractive (Schrader, Nr. 171/172, p. 50). For eastern Germany as a whole 12.8 percent of area was set-aside in 1990/91 -- 19.2 percent in Brandenburg -- which was a considerable cut in the region's production capacity (table 7). The comparable figure for western Germany was 4.1 percent. The incentive to participate in the 1991/92 crop year was also strong but the differences between the two parts of Germany was less extreme. Also in the east, states with generally poorer soils and with fewer restructured farms, such as Brandenburg and Mecklenburg-Pomerania, tended to have more set-aside. The results of these efforts were that while initially crop prices were under great pressure, they relatively quickly stabilized at western German levels. On average for 1991 eastern German grain producers faced no price disadvantage over their western counterparts (Isermeyer, p. 295).

Another effect of the policy was that the land price was artificially supported above the competitive return (Schrader, Nr. 171/172, p. 50). This had the potential of affecting the future structure of the sector by discouraging production of commodities which required a low land price to be profitable.

As indicated by the adjustments the conditions were not uniform for all crops. The price adjustments to EC levels differed by crop and this led to relative price shifts. Table 8 gives the adjustments in the gross margin by crop for four enterprises located on unfavorable areas due to adoption of western German prices with 1989 technology. The changes in gross margins correspond roughly to the observed changes in area in area and production. The least severe

Table 7: Set-Aside of Crop Area in Germany by State, 1990/91 and 1991/92

State	1990/91 Total[1]	1990/91 Share of Area[2]	1991/92 5-Year	1991/92 1-Year	1991/92 Total	1991/92 Share of Area[2]
	thd. ha.	percent	-- thd. ha. --			percent
Old States						
Schleswig Holstein	24.7	4.3	27.7	4.5	32.2	5.6
Lower Saxony	84.0	4.9	101.9	28.2	130.1	7.6
Hesse	28.8	5.6	41.1	2.6	43.7	8.5
Rhineland Palatinate	22.0	5.1	31.5	4.7	36.2	8.5
Baden Wurttemberg	37.7	4.5	45.6	3.8	49.4	5.9
Bavaria	71.1	3.4	86.2	7.8	93.9	4.5
Saarland	1.1	2.8	1.6	0.9	2.5	6.4
North Rhine Westphalia	29.4	2.7	37.8	7.7	45.5	4.2
Total	299.8	4.1	374.4	60.3	434.6	6.0
New States						
Brandenburg	207.3	19.2	20.0	91.3	111.3	10.3
Mecklenburg Pomerania	144.0	12.7	[3]	77.1	77.1	6.8
Saxony	66.0	8.7	18.5	18.4	36.9	4.9
Saxony-Anhalt	123.9	11.8	48.6	55.4	103.9	9.9
Thuringia	57.2	8.7	17.8	12.5	30.3	4.6
Total	599.2	12.8	104.9	254.6	359.5	7.7
Germany	899.1	7.5	142.4	314.9	794.2	6.6

[1] A 5-year EC program for the old states and a 1-year special program for the new states.
[2] Share calculated based on 1990 crop area.
[3] A 5-year program was not offered.
Source: Fasterding, p. 87.

Table 8: Gross Margins by Crops on Unfavorable Areas Due to Price Changes[1]

Crop	East German Prices	West German Prices	Ratio
	Marks per ha[2]	DM per ha	
Winter Rye	860.41	176.80	0.2055
Winter Wheat	1908.86	952.02	.4987
Summer Wheat	725.44	339.74	.4683
Winter Barley	767.67	196.90	.2565
Summer Barley	435.77	130.60	.2999
Triticale	769.91	-3.96	--
Rapeseed	1767.37	917.03	.5189
Potatoes	3887.05	1297.42	.3338

[1] Based on 1989 conditions.
[2] East German marks.
Source: Zeddies, Jarosch, and Heilmann, p. 3.

downward adjustment in gross margin is shown for rapeseed and that crop has sharply expanded area and production. The fall in gross margin for wheat is somewhat greater than for rapeseed -- wheat area fell 2.3 percent from 1989 through 1990 but recovered in 1991 for a 1.5 percent gain compared to 1989. Meanwhile output rose 35.8 percent. Barley shows a more severe drop in gross margin than wheat and area fell from 1989 to 1991 despite an initial rise in 1990. Barley output rose slightly -- 6.3 percent. The largest downward adjustment is shown for rye -- its area fell 45 percent from 1989 to 1991 and output dropped 31.3 percent.

The indicated adjustment in the gross margin for potatoes does not fit the observed area decline. The gross margin ratio for potatoes is 0.33 -- an adjustment in the middle of those shown. Yet area fell the most from 1989 to 1991 -- 73 percent. Thus, other forces were at work. In East Germany both food and feed use of potatoes were very high and these were expected to drop (Scholz, p. 5). Food use would shift away from potatoes and towards higher quality foods. Feed use would be reduced by a substitution of other feedstuffs and via the fall in livestock numbers. Furthermore, East German potato yields lagged West German yields and as that gap narrowed less area was needed to produce the required output.

The set-aside program also affected the crop relationships. The fall in total crop area was strongly related to the set-aside. Including the set-aside in the total area shows that from 1989 to 1991 total area was hardly changed. Among the grains, rye was the strongest affected (Böse and Welschof, p. 2). This was reflected in the large set-aside for Brandenburg with its sandy land. In eastern Germany potato were also included in the set-aside program which caused a reduction in that crop's area.

One of the early observed adjustments to the introduction of market forces was the rapid liquidation of large numbers of livestock. In addition to the general forces affecting the sector which tended to work against livestock in particular, there were a number of factors specific to the eastern German livestock industry. These included: defective capital, over-sized units, a defective marketing system, low factor productivity, a deteriorating price-cost margin, and the introduction of milk quotas (Agra-Europe, 38/90, Dokumentation pp. 3, 4, 6).

Of the existing livestock facilities in eastern Germany few were suited by size, technology, and condition to the needs of a market economy (Agra-Europe, 45/91, Länderberichte p. 28). One factor was age and labor-intensity. A substantial share of the facilities stemmed from the 1950's and 1960's and had not been upgraded. The labor use in these facilities was very high and at an assumed wage of 15 DM per hour many units would need to be retired. The expectation was that employment would need to be halved (Weinschenk, et al, p. 4). To retain livestock in this new environment most facilities would need rebuilding or replacement which was difficult for enterprises with old debts and acute cash flow problems (Agra-Europe, 45/91, Länderberichte p. 28).

Another problem with eastern German livestock units was size. While increased size offers economies of scale and the potential for gains from specialization, eastern German sizes were excessive. The size of units created increased organizational problems and mistakes in decision making. Size and concentration in facilities with limited land raised feed expenses, caused manure disposal problems, and created health difficulties for the animals. Labor use in these facilities was excessive (Agra-Europe, 38/90, Dokumentation pp. 6-7). Furthermore,

privatization was a problem for the large facilities. Whereas land could be privatized in various sized units, a 400 cow dairy barn remained exactly that. If former state and collective farm members could have obtained the capital needed to buy and renovate these large facilities more would likely have stayed in operation. But former members of socialist agriculture lacked experience and collateral to obtain the necessary finances. Given their liquidity problems they were unable to finance investment from their own resources. Additionally, as East German livestock enterprises were generally without the land needed for manure disposal, acquisition of such land also had to be financed.

The eastern German livestock industry also suffered from a weak processing, marketing, and distribution system. The chain moving the livestock from the farm gate to the consumer suffered the same bottlenecks as the economy in general. Organizationally the firms were weak and inefficient. The capital stock was old, worn-out, and labor-intensive. Processing plants were generally not capable of meeting western quality standards and offered limited varieties of products. In contrast, crop products could be more easily transported west to offset the difficulties faced by that processing sector. Faced with competition from the west following economic union sales of livestock products collapsed (Böse, p. 6).

Livestock producers faced an extreme price-cost squeeze. Per unit costs were high due to their inefficiency, to their production factor costs, and to old debts carried, while adjustment to EC prices cut returns. Cattle showed a negative return of 432 marks per animal while swine had a negative 33 mark return (Böse and Welschof, p. 1). Livestock slaughter was used to generate liquidity (Isermeyer, p. 295). Distress slaughter combined with a collapse in demand created severe price pressure. This led to heavier weights and then to further price pressure (Fock and Kreitmaier, p. 89). Compared to crop products the fall in livestock prices was greater and of longer duration -- extending well into 1991. Whereas by mid 1991 grain prices had stabilized near western levels, prices for meat and milk in eastern Germany averaged below those in western Germany with large regional differences (Isermeyer, p. 295).

Compounding the problem was the introduction of EC milk quotas. Milk quotas were introduced in two steps. First, there was a guaranteed quantity eligible for price support through March 31, 1991 which was 8 percent below the 1989 level. This was part of the treaty of economic union which provided for minimum prices for sensitive commodities like meat and milk. Excess quantities were sold at a much lower price. After April 1, 1991, EC milk market rules were in force with milk deliveries at 80 percent of those in 1989 (Schrader, Nr. 171/172, p. 20). The 20 percent reduction in milk deliveries meant a 30 percent cut in output for individual producers because the state governments built a 10 percent reserve of quota rights which they controlled for distribution (Heiber, p. 68). The reserve was to be given to producers who in 1989 had unusually low output, to reprivatized operations, or to special heifer breeding units.

Besides the direct output cutting impacts of the quotas, they compounded the adjustment problems in eastern Germany through their implementation. Like the sugar quotas they were output calculated so that increased milk yields through improved efficiency meant a sharper cut in milk cow numbers. The quotas were set regionally on the basis of 1989 output. That regional output reflected the misallocation of production due to the East German regional autarky policy. Unlike other EC regions, the quotas were not tradeable or able to be leased (Schrader,

Nr. 171/172, p. 20). Thus, the regional misallocations of 1989 could not be overcome by trading quotas. Areas which had a potential advantage in dairy were prevented from expanding while other regions less suited to dairy were pressured that direction.

The Future Agricultural Production Structure of Eastern Germany

The purpose of this analysis is to draw a picture of the future production structure of eastern Germany under market forces. For that purpose three sets of information are presented. The first is a review of the production structure of the sector before the Second World War and how it related to that in the west. Thereafter the paths taken by the eastern sector under communist central planning and the west under EC policy are discussed. Finally the initial adjustments as market forces were introduced is considered. While the actual outcome in the future will be strongly influenced by agricultural policy--notably EC reform of the Common Agricultural Policy--some general patterns can be forecast.

Before the Second World War the areas which would become Eastern Germany were more focused on crop production than western regions while the role of livestock in the west was greater. The location of the livestock was also reflected in land devoted to pasture. Among the crops there were also differences in pre-war patterns. For rye, oats, potatoes and to some extent for barley, the future East Germany was overrepresented based on size. For wheat, Eastern Germany was underrepresented based on relative size. In the case of sugar beets, the future East Germany was dominant.

Another conclusion from the pre-WWII data was that the relative crop orientation was in general strengthening. Over the 1883 to 1937 period the relative share of swine in "East" versus "West" Germany was clearly falling. The shares for cattle and poultry were stable--falling some in the 1930's. The relative shares of East Germany for wheat and barley area were rising. The ratios of rye, oats, and potato areas in the two regions showed no trend. The short data series for sugar beets, in contrast, showed a falling share for the East.

Pre-war crop yield comparisons of the two regions showed equal or greater yields in the east, except for sugar beets. Consistent yield advantages for the future East Germany could be seen for wheat and barley. The other crops showed generally equal levels of yields.

The post-war data --1949-1989-- exhibited a much different set of trends. The communist government pursued a regional autarky policy combined with a pro-livestock bias in its plan. This pushed the production structure the opposite direction from the pre-war picture. Compared to West Germany, East German livestock populations rose. For crop areas the post-war trends in East Germany relative to West Germany were also different than the pre-war years. The ratios for wheat and barley areas in East and West Germany exhibited a rising pattern just as before. Yet the post-war level of the ratios were far below those seen in the 1928-1937 period--more like the 1888-1914 years. Oats and rapeseed illustrated a sharp decline in their area ratios which were counter to the pre-war period. In sugar beet area East Germany lost its absolute dominance in 1951. Although East German rye and potato areas were falling, the rates of declines were far less that West German rates.

Yield comparisons also showed great differences between pre and post-war data. For wheat and barley where East Germany held a pre-war yield advantage, slower growth resulted in a slight yield disadvantage in the 1970's and 1980's. For other crops where there had been no regional difference before the war, East Germany lost ground. Sugar beet yields were the most extreme example. Whereas West German yields nearly doubled, East German yields remained in the range seen during the 1930's.

The initial adjustment to market forces was in general toward the patterns seen before the Second World War -- in favor of crops and against livestock. Total crop area remained roughly the same while large reductions in numbers of all livestock types occurred. These adjustments were the result of several forces. At the macroeconomic level the joint labor market with western Germany and the currency conversion were less disruptive to crops than to livestock. The relative price adjustments needed to bring East German prices down to EC levels also favored crop commodities over livestock. While both crop and livestock enterprises had defective capital stocks and organizational structures, the efficiency problems in livestock enterprises were comparatively more severe. The imposition of milk quotas also hampered livestock.

Within the crops the trends of East Germany which had run counter to developments in the west were quickly reversed. Thus, area for rye and potatoes contracted sharply. For potatoes this area contraction was accelerated by the set-aside. In this area reallocation, rapeseed benefitted greatly. Wheat and barley areas remained about the same level, while output rose due to yield gains. Developments in sugar beets were the opposite of what would have been predicted based only on the historical comparison as area has not expanded. This reflects the imposition of EC output quotas which limit the production rise and the rise in yields.

In regard to the longer run production patterns the information suggests some hypotheses. First, the role of livestock in the areas of the former Democratic Republic will diminish compared to that seen in the 1950-1989 period. This shift is consistent with the pre-war situation and is shown in the early adjustments. It also reflects with the continuing dairy surplus problems of the European Community and attempts by the EC to control that problem. Yet it is also possible that the large herd reductions of the past two years were excessive and that livestock could experience some recovery. Eastern Germany has no natural disadvantage in livestock production and has some potential advantages. One advantage is its thin population density. Land is potentially available at low cost. Conditions in many regions are favorable for the development of extensive livestock operations in conjunction with feed crops (Isermeyer, 12/91, pp. 305).

How this unfolds depends on agricultural policy. A future livestock industry requires new capital investment, but present investment aids programs limit investment for livestock and livestock facilities. Furthermore the collateral needed to access the investment aids that are provided is limited and current farmers face severe liquidity problems which limit own capital formation. Another factor is that the facilities need to be of sizes which are efficient and capable of generating an adequate income. The existing facilities are too large for use by the emerging private farmers and livestock facilities are not easily subdivided. Through April 1991, with the exception of poultry, livestock continued to remain largely in large units. The poultry flock distribution reflected the large private holdings in East Germany. These larger units were

either cooperatives, corporate farms, or unrestructured collectives and concerns about the sustainability of these cooperative forms have been raised. If the farm structure is forced by policy to become one of small farms or if the present large organizations cannot compete, recovery of livestock in eastern Germany will be hampered by the existing large facilities. A structure of small livestock producers as practiced in western Germany would require a completely new set of facilities which would be difficult to finance.

Recovery of the livestock industry will also be conditional on upgrading the processing, marketing, and distribution system. Privatization of slaughter plants, meat and milk processing factories through 1991 has been slow. Without adequate processing recovery in livestock will not be likely. To some extent new cooperatives are adopting a strategy of vertical integration in the livestock sector to fill this deficiency. At this point their success in competition with established western packers remains problematic.

Also agricultural policy needs to be more flexible even if it remains restrictive overall. Policy must allow specialization in livestock production by regions which have a comparative advantage in that activity. There are regions in eastern Germany which have few alternatives to livestock. Until now, the milk quota system has hampered this development. Another critical feature for a successful livestock sector is the land price. The present policy of long-term leases for state-owned land rather that sale of that land gives the appearance of trying to limit downward adjustment in land prices. This could hinder the recovery of livestock in eastern Germany.

Total crop area is likely to shrink as marginal land was forced into crop production under central planning. The rate of decline in total cropland in East Germany was less than in West Germany and this will likely adjust. Ecological concerns will heighten this pressure. Again agricultural policy will affect the extent of adjustment, such as the level of set-aside payments, price supports, and payments for forestation.

Within the crops sector there will be shifts among the crops as well. The former importance of potatoes and rye will be lost. These areas will shift in favor of rapeseed, wheat, and barley. Yield increases will magnify this shift. Wheat and barley will also benefit from the shift out of sugar beet area. Future yield increases for sugar beets in conjunction with the production quota system will force area out of sugar beets unless the present quota allocation is altered to give a greater allowance for eastern Germany.

It is unlikely that these production adjustments will be balanced by demand changes. Per capita food demand in East Germany was near to or for some commodities exceeded levels in West Germany. Within the price structure there was a considerable distortion of relative prices. Basic foods were heavily subsidized and removal of those subsidies resulted in a rise in their prices. Prices for other goods which had been held artificially high and rationed fell after economic union. The expectation is that total consumer expenditure will shift away from food and that food consumption patterns will shift toward West German patterns. That would raise the meat and dairy products components of food expenditures. Fruits (tropical) and vegetables would also benefit. Much lower consumption of grains and potatoes is expected. Overall an increase in quality and variety is expected, but not quantity. Reduced livestock numbers will cut feed use. Improved feed quality will likely expand demand per animal for protein feeds, and

the introduction of EC price distortions will encourage grain substitutes. Feeding of potatoes, root crops, and probably grain, will decline.

With the decline in food demand in eastern Germany and the contraction of the livestock sector, expansion of wheat and barley production will add to surplus pressure within the European Community. This has already happened to some extent, but will likely become more intense. A larger grain surplus will pressure intervention costs and export refund costs. Trade tensions with grain exporting countries could be heightened. The increased protein share of the smaller livestock industry will likely be met mostly through the growth in rapeseed output rather than through imports -- much to the dismay of oilseed exporting countries. Some gains for exporters of grain substitutes can be anticipated. Overall it is unlikely that eastern Germany will follow the path seen for China following its reforms in 1979 where increased production was followed by larger income gains in later years and after an initial drop imports rose.

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