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International Comparisons of Costs of Wheat Production in the EC and United States

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Abstract

Multilateral Tornqvist indices are computed with 1984-86 cost-of-production data for wheat from seven EC countries and the United States for cross-country comparisons. The major producers of wheat used almost equal quantities of goods and service inputs per unit of production. On the basis of a purchasing power standard, however, absolute costs of production in the United States are found to have been lower than in France and the United Kingdom. This study shows how costs of production can contribute to the understanding of international competitiveness.

Keywords: Costs of production, productivity, competitiveness, purchasing power parities, wheat.

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Summary

The United States, United Kingdom, and France, in 1984-86, used nearly equal quantities of goods and service inputs to produce one unit of wheat. Technical determinants of wheat production in these countries were more or less similar. However, absolute costs of production, based on an average long-term exchange rate (such as the global purchasing power parity (PPP) rate), were lower in the United States than in France and the United Kingdom. Lower prices of physical inputs such as land, fertilizers, and fuel gave the United States this cost advantage.

For the three countries to compete in the world wheat market, the input and output prices were more important than the technical determinants of wheat production. Input prices, exchange rates, domestic and trade policies, and the efficiency of the transportation and marketing sectors were the major determinants of competitiveness.

Compared with other European countries, the price of wheat in France was low due to excess supply, quality differences, and an inefficient marketing sector. In some EC countries, high wheat prices compensated for higher production costs. Agricultural income per worker, another indicator of competitiveness, appears to have been higher in the United States and the United Kingdom than in France.

This study shows that cross-country comparisons of costs of production can help in understanding the countries' competitive positions, if inconsistencies in the country data and exchange rate problems are reconciled. The comparisons of input use efficiency and price effects are made across countries with multilateral Tornqvist indices computed from the standardized cost data of 1984-86. However, more current data might alter the results of the study and its implications.

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Introduction

International comparisons of costs of producing agricultural commodities are useful for a better understanding of competitiveness in world commodity markets. There are many problems, however, in comparing costs of production among countries. There are fundamental differences in the data available from different countries (Ahearn and others, 1990; Sharples, 1990; Goldin, 1990). Different countries have different accounting methods. The structure of production varies widely from country to country (for example, farms predominantly using family labor vs. farms using hired labor). Microeconomic conditions, such as the presence of excess labor, vary across time periods and countries. Macroeconomic conditions, such as the exchange rate and interest rates, also vary across time periods and countries. All of these differences make it difficult to compare commodity production costs in different countries.

This paper addresses two problems associated with cross-country comparisons of cost-of-production estimates: defining and estimating comparable production costs, and finding an appropriate exchange rate. Because countries use different procedures to collect and record cost-of-production data, comparisons based on such data, without reconciliation, would be of little significance. For instance, the computation of economic costs of landownership or family labor in two countries where the proportions of rented land and hired labor are very different can change the ranking of costs of production.

Cross-country comparisons require that costs of production be expressed in a common currency. However, expressing costs of production in a common unit is made difficult because of the high variability of exchange rates. Furthermore, economists disagree on the correct definition of an exchange rate. Most often, absolute costs of production are compared across countries using nominal exchange rates (Stanton, 1986). Aside from volatility of currencies, the nominal exchange rates do not usually reflect the purchasing power of currencies (Kravis, 1984). Moreover, effects of domestic input price changes are hardly taken into account in such comparisons.

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This study puts forth a procedure for comparing costs of wheat production for the United States and seven European countries--France, the United Kingdom, the Netherlands, Italy, Germany, Greece, and Ireland. Cost-of-production data in the European countries were provided by the Commission of the European Communities, and U.S. data by the Economic Research Service (ERS) of the U.S. Department of Agriculture. Discrepancies between the two sets of data were reconciled to create a consistent international data set.

Data for Costs of Production

The cost-of-production data for the European countries are generated from the Farm Accountancy Data Network (FADN) of the Statistical Office of the European Communities (SOEC). FADN collects farm accounting data for all EC countries, using similar conventions and accounting methods, from a sample of 60,000 farms. U.S. costs of production are computed by ERS from the Farm Costs and Returns Survey (FCRS) data. In both cases, the data are derived from sample surveys, following independently defined cost concepts, measurements, and representations.

FADN is a useful source of farm data for EC countries because full-time farms are a significant part of the sample. The representation is remarkably good in some countries, such as Denmark. In other countries such as France, where very large farms are underrepresented, a weighting scheme is used to correct the bias. On the whole, the sample is representative of the farms whose combined output constitutes 90 percent of the national production. Another advantage of FADN is that the data are collected in every EC country on the basis of similar definitions, accounting conventions, and compilation procedures.

FADN does not provide information on enterprises, complicating the use of data for costs of production for individual crops. Costs need to be allocated to specific enterprises. Although some European countries do collect data on individual crops within and outside FADN, they do not publish this information. Even if such information were published, it might not be compatible with other country data.

Recently, the EC Commission, in a joint undertaking with the Institut National de la Recherche Agronomique (INRA) and Institut National de la Statistique et des Etudes Economiques (INSEE), France, sponsored a study to allocate the production costs among different crops (Butault and Cyncynatus, 1991). The method consisted of computing input/output coefficients by regressing different costs on various crop output values. Proportionality between the product and the input is assumed, and the total input value is the sum of the allocated input per unit of output multiplied by the amount of output. For example, the coefficient α_{ijt} is estimated using the function,

$$C_{int} = \Sigma_j \alpha_{ijt} Y_{jnt} + u_{int}$$

where C_i are inputs, $i=1,..,I,$; Y_j are outputs, $j=1,..,J$; n indicates the farm; and t the year. Several different estimating procedures were applied, such as joint generalized regressions, absolute mean deviations, generalized least squares, covariance regressions and error component models on time series and cross-section pooled data, and ridge estimators. Various estimates of costs of production were derived and reported on a regional and national basis (Butault and Cyncynatus, 1991). Despite multicollinearity problems in some cases (Belgium, Denmark, Luxembourg), the quality of estimation was considered satisfactory. In this report, we used ordinary least square (OLS) estimates of the costs of wheat production at the national level as developed by Butault and Cyncynatus (1991). These estimates give unit costs per 100 kilograms of wheat (excluding special wheat varieties like hard wheat, which is used in such food items as pasta and semolina) for every EC country.

A major limiting factor in using the FADN data is the time it takes to collect and compile the data. It takes several years for the national institutes to gather and verify the accounting data, and then for the EC Commission to complete the compilation of the database. Because of this delay, 1986 is the most recent year for which data are available for EC countries.

For the United States, ERS generates the costs of production of wheat from the FCRS data. FCRS data are similar to FADN data in that full-time farmers are strongly represented. However, U.S. data differ from the EC data in many respects. First, the U.S. costs of production are estimated by a budget generator using estimates of expenditures on specific goods. FCRS surveys are conducted every 4 years to gather information concerning farmers' production practices and input uses (USDA). Estimates of certain input uses such as fuel, repair, machinery, and capital replacement, are calculated using engineering coefficients determined from technical relationships of an input-output matrix. Second, the U.S. list of cost items does not correspond to that of the EC countries. Also, certain accounting conventions, especially for computing fixed costs, are different in the U.S. data (Appendix).

Methodological differences were reduced through a data harmonization process that realigns cost estimates by component and then measures cost items in a common system. The EC costs were matched with U.S. costs on the basis of EC procedures that put greater limitations on the data sources. Although cash expenses are directly comparable, we slightly rearranged the cash cost of U.S. data to match the European cash cost items. Because the proportion of hired labor to total labor is different in various countries, any comparisons that take only hired labor into account would be meaningless. Therefore, imputed costs for family labor are computed. The FADN takes into account the "excess labor" in the small farms, while the U.S. method uses standard hours worked as labor input. To make these measures comparable, we used direct labor costs per hectare along with management costs, which are taken from the National Agricultural Statistical Service (NASS) rather than ERS.[1]

For the fixed costs, we focused on items that are effectively paid. For example, land costs include land rents, interest on real estate loans, and land taxes. Capital costs, which include repairs and depreciation, were computed for both data sets in a consistent manner.

The item-by-item matching process provided for similar definition and measurements of the two data sets. Nevertheless, it is impossible to eliminate all differences between the two data sets as long as they are independently generated and follow different approaches. In spite of this, the matching process smoothed out many differences in the two data sets.

Price and Quantity Components in Costs of Production

Costs of production are often used as a synthetic indicator of competitiveness. Several studies have analyzed absolute costs of production of wheat in the European countries (Carles, 1991) and have compared them with U.S. costs (Acher, 1990; Stanton, 1986). Costs of producing one kilogram of wheat in different countries are generally compared via nominal exchange rates. Exchange rates,

[1] The ERS cost of production takes into account the labor directly used in growing wheat. This corresponds, for instance, to 1.6 hours worked per acre of wheat per year. It does not account for the labor devoted to general management activities or used on the farm. However, the NASS figure for the quantity of labor, which corresponds to 2.5 hours per acre, is more consistent with the EC measurement of labor. The latter figure was used, although it is possible that it does not take into account the excess labor used on farms to a similar extent as the EC figures.

however, vary greatly over time; for instance, the parity rate between the European currency unit (ECU) and the U.S. dollar can double within a few years. Even though such an approach can provide information about the ability of a country to export relative to other countries, the high volatility of nominal exchange rates can defeat the purpose of real value comparisons.

Apart from the exchange rate problem, production costs also reflect the effects of input prices. For instance, the price of land varies from country to country and can explain major differences in the costs of production. Differences in input prices can be due to national policies (interest rates), national economic conditions (wage rates), and the level of competition or efficiency in the input industry. Costs of production also reflect the legal environment in agriculture (such as inheritance and environmental regulations) and indirect supports through the tax or credit systems.

Absolute levels of input prices strongly influence the competitiveness of agricultural products as well as farmers' incomes. Technical efficiency (productivity) and national economic conditions faced by farmers (relative prices) further determine costs of production and incomes. Thus, we tried to distinguish between a "quantity" effect and a "price" effect of inputs and outputs on costs of production. This requires construction of multilateral productivity indices, as well as specific purchasing power parities (PPP's) for inputs used in the production process.

The PPP's between two countries indicate a rate at which a given amount of national currency must be converted to purchase the same quantity of product in both countries. Specific PPP's at the basic heading levels are computed as a price ratio (expressed in national currency) for a physical quantity of product.[2] A conversion rate equates prices of a product in two countries. For instance, if the price of one unit of wheat is FF100 in France and $20 in the United States, then the wheat PPP is $1=FF5. If, on the other hand, the nominal exchange rate is $1=FF4, then French wheat becomes more expensive in the world market ($25 per 100 kilograms). The ratio between the wheat PPP and the nominal exchange rate gives an index of wheat prices between the two countries relative to the exchange rate.

Similarly, if 100 kilograms of nitrogen cost FF490 in France and $70 in the United States, the nitrogen PPP is $1=FF7. The ratio between the wheat PPP and the nitrogen PPP corresponds to an index of relative prices of the two goods considered. In this example, since the price of wheat relative to fertilizer is higher in the United States than in France, more nitrogen can be purchased in the United States (0.29 kilograms) than in France (0.20 kilograms) for the price of one unit of wheat. Of course, the production of wheat requires a combination of several inputs and, therefore, it is necessary to aggregate the specific PPP's of every input so that it represents the ratio of prices of the set of inputs. We did that by using spatial multilateral indices described later.

Finally, the PPP's are used as spatial price indices to compute implicit real value (quantity) indices. This makes it possible to compute a "quantity cost" index that represents the relative aggregate quantities of inputs used in the production of one unit of wheat. PPP's also provide useful information on measuring price distortions that can benefit producers in a specific country. A few empirical studies that use PPP's for the agricultural sector have been conducted in Europe, mainly for the EC countries (Butault, 1988; Goossens and Tollens, 1989; Terluin, 1990).

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[2] The basic heading level is the most detailed level of the product at which it is considered homogenous for achieving price and quantity aggregation. In multilateral comparisons, aggregation difficulties arise when a product is not exactly identical, or available in various kinds, in different countries. In some countries, the product is not produced or sold, resulting in a price ratio that cannot be calculated. At the basic heading level, the product or its representative in the void countries is identifiable across countries. For instance, the basic heading levels for fertilizers are the nutritive substances (phosphate, potash, nitrogen) that correspond to the various types of fertilizers purchased in different countries.

Choice of Index Numbers and Economic Theory

The methods developed to take into account a "quantity" effect and a "price" effect can be found in the nonparametric measures of productivity (Capalbo and others, 1991); and in comparisons of national incomes and price levels (Kravis, Heston, and Summers, 1982) made by the United Nations International Comparison Project (ICP) and the SOEC. Both types of studies attempt to estimate more accurately real GDP per capita in different countries. In addition, these studies provide useful comparisons of competitiveness.

The index-number theory, developed by Samuelson and Swamy (1974) and extended by the numerous fundamental works of Diewert (1978, 1981, 1988), evolved from economic theory. The approach has been mainly developed for intertemporal comparisons, but it can also be used for making intercountry comparisons, distinguishing productivity and input price differences in two countries and their contributions to the measurement of cost efficiency. Index-number theory defines discrete approximations that can be empirically implemented using only observed prices and quantities of outputs and inputs. If the indices (quantity, price, and productivity) are exact for a corresponding aggregator function (transformation, production, cost, profit, or revenue), the resulting approximation errors are small. Therefore, certain index numbers have underlying functional forms that reflect the production process. An exact index is "superlative" if based on flexible functions that do not imply strong assumptions about the technology (Capalbo and others, 1991). The most common of the superlative indices are the Fisher and Tornqvist indices, which are exact for generalized quadratic and translog functions, respectively.

These indices can be used in cross-country (spatial) bilateral comparisons of inputs, outputs, productivity, and prices (PPP's) of the aggregate input necessary to produce one unit of wheat. A Tornqvist index of the quantity of input (or output) between country A and country B, T_{AB}, is given by:

$$lnT_{AB} = [\sum_{i}^{n} 0.5 \, [(\frac{P_{iA}Q_{iA}}{\sum_i P_{iA}Q_{iA}} + \frac{P_{iB}Q_{iB}}{\sum_i P_{iB}Q_{iB}}) * (lnQ_{iA} - lnQ_{iB})]]$$

where P_i and Q_i $(i=1,..,N)$ are the prices and quantities of inputs or outputs, respectively. The first two terms on the right side are shares of ith input (or output) in country A and country B. The Tornqvist index is thus derived by multiplying the average shares by the log differences of quantities in the two countries.

To ensure transitivity of the index, and to have consistent bilateral comparisons of more than two countries, it is necessary to use a multilateral version of this index. The multilateral version of the Tornqvist index is called the CCD index proposed by Caves, Christensen, and Diewert (1982) and Christensen, Cummings, and Jorgensen (1981). The multilateral version of the Tornqvist index is made transitive by using a fictional country as a basis. The quantity index of input between country A and country B is:

$$lnT_{AB} = [0.5\sum_i (S_{iA}+\overline{S}_i)(lnQ_{iA}-ln\overline{Q}_i)] - [0.5\sum_i (S_{iB}+\overline{S}_i)(lnQ_{iB}-ln\overline{Q}_i)]$$

where

$$S_{iA} = \frac{P_{iA}Q_{iA}}{\sum_i P_{iA}Q_{iA}} \qquad S_{iB} = \frac{P_{iB}Q_{iB}}{\sum_i P_{iB}Q_{iB}}$$

are ith input cost shares in countries A and B, and the bar indicates arithmetic mean of the cost shares over the countries studied.

This index is not reversible, that is, the product of price and quantity indices for an aggregate is not exactly equal to the value index. This index does not vary with the change in base country. It has not been widely used in comparisons of national incomes and price levels (by OECD or SOEC) because it does not satisfy additivity (that is, adding up the real values of the components of an aggregate does not give the real value of this aggregate). Additive indices used in empirical studies, such as the ICP, however, have other shortcomings and are not superlative.

The theoretical advantages of using superlative indices in multilateral comparisons are important from another economic point of view. Other types of indices (Laspeyres, Paasche, Geometric) have nonflexible underlying functional forms that correspond to very restrictive assumptions about input substitutions. (For instance, the Cobb-Douglas production function corresponds to the geometric quantity index of inputs.) In contrast, superlative indices allow one to consider very general production structures without imposing constraints with regard to the technology or bias of technical progress.

A CCD index was used in this study to compute: (1) the quantity index of the aggregate input used in producing one unit of wheat in every country; and (2) the price index of the aggregate input. Construction of these indices was made possible by using the absolute costs of production. The factor shares are the value shares of each input in the cost of production of one unit of wheat. For the quantity index, some input quantities from the costs of production were directly used as Q_i (for instance, land area used to produce one unit of wheat is taken from the yield data). For other items, quantities were computed from the values in the costs of production and the price data. For the price index, the unit price of every input listed in the cost of production was used.

Factor shares were calculated differently than the standard version proposed by Caves, Christensen, and Diewert (1982). The country share is weighted by the physical production of wheat in the eight countries considered. Unlike previous approaches that chose one country as a numeraire (Kravis and others, 1982; Kravis, 1984), we chose the aggregate of seven EC countries as the base unit, obtained by adding quantity indices across countries. The transitivity property of the index (Diewert, 1988) makes it possible to equate the real value of every item in ECU's, converted with the specific PPP's using a scaler transformation. This approach provided "horizontal" additivity for the EC aggregate so that every item of the aggregate index is equal to the sum of the country components. Of course, this approach does not change relative comparisons between countries, but it allows relative comparisons to an aggregate that is more significant than the basis of the standard Tornqvist index.

Price Data

Computation of unit quantity costs from the absolute costs of production requires information about the representative prices of outputs, intermediate inputs, and fixed factors.

To make output prices consistent across countries, we added subsidies and governmental supports to--and deducted taxes from--farmgate product prices. The U.S. output prices include direct government payments made to the wheat sector. EC prices are set far above the world price through the Common Agricultural Policy (CAP) supports.[3] The subsidies and governmental supports are so intricately tied with the product prices that it is difficult to separate them. In both cases, product prices represent prices received by farmers.

Many sources were used to prepare the price database. The U.S. price data came mostly from ERS and NASS. For the seven European countries, relative PPP prices for every item across countries were obtained from various sources. Prices of the intermediate inputs required to compute PPP's were mostly available from SOEC and FADN.[4] For the same product with different components, such as fertilizers, averages of the component prices were used. Some PPP's of subaggregate items (depreciation, machinery repairs, etc.) were obtained from the SOEC or the United Nations GDP comparison project, after making corrections for the value-added taxes (VAT).[5] For the residual item "other goods and services," we used GDP-based PPP's.

The VAT was excluded from the cost computations since it is determined differently in different countries. Extraction of VAT from prices was not a problem for countries where it was separately reported. However, in several countries (Germany, the Netherlands, Belgium, Luxembourg, and Ireland), the VAT is based on a forfeit system, and was not separated. Farmers purchase inputs and sell output with the VAT included. Thus, under the forfeit system, the difference between the VAT paid and received is not subject to payment to the government (or from the government if more VAT is paid than received). Depending on the VAT rates on outputs and inputs, this system can generate higher or lower profits to farmers. If the VAT rates on outputs and inputs are the same, farmers are generally gainers in a forfeit system because the VAT encompasses all sales, but only a part of the costs (intermediate inputs and investments). If rates are different, the forfeit system can lead to either gains or losses for the farmers. For instance, the forfeit system favored German farmers in 1984, as the VAT rate on output was 13 percent and the rate on some inputs was 7 percent.

In countries where a forfeit system prevailed, the difference between the VAT paid and received by farmers was computed and considered as an increase or decrease of output prices. Also, levies and taxes to finance excess product disposal were treated as output price reductions, not taxes.

The prices of fixed factors are considered user costs. As for fixed capital, an estimate of the price is made from depreciation and interest paid. The implicit price of capital is defined as the value of depreciation and interest for machinery and equipment, divided by the implicit quantity index for capital.

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[3] Under CAP, a set of regulations is imposed by which EC countries seek to merge their individual agricultural programs into a unified program to promote agricultural development, stable markets, increased productivity, food supply security, and a rising standard of living for farmers. The variable levy and export subsidies are two principal elements of the CAP (Lipton, 1991).

[4] SOEC maintains the price data in its CRONOS data bank under PRAG domain.

[5] Value-added taxes are collected at each stage of production and imposed on the "value added" after subtracting raw material costs used from earlier stages from the subsequent selling price (Lipton, 1991).

The user cost of land is defined by the actual cash expenses paid for land tax, interest on real estate loans, and rent (if rented). The land input used in the production of a unit of wheat is calculated from the regional average yields given in the national data.

The compensation for family labor is imputed on the basis of hired labor wage rates available from FADN for the EC, and from ERS for the United States. Family labor is included in the total cost as an economic cost.

Results are presented as averages of 1984, 1985, and 1986, the most recent years for which cost-of-production data are available. First, we analyze the relative price differences for inputs and outputs and then present comparisons in terms of quantity costs computed with the CCD index. Then the absolute costs of production are presented in value terms.

Relative Output and Input Prices

The price system in a country can be treated as a determinant of competitiveness as well as technical efficiency. Relative prices are defined as the ratio of specific PPP's of output and inputs to the nominal exchange rate or to a GDP-based PPP. The price indices relative to GDP-based PPP's are more meaningful than those relative to a nominal exchange rate.[6]

The index that is less sensitive to the exchange rate is certainly the ratio of output to aggregate input parities.[7] The ratio of wheat prices relative to inputs gives an indicator of the differences in the price system between countries. The ratio corresponds to the purchasing power of the output in terms of quantity of inputs; that is, the quantity of inputs that can be purchased with a certain quantity of product in different countries.

Causes of Variation in Relative Prices

Relative prices can vary between countries due to various factors such as the quality of products and efficiency of the food sector in pricing agricultural raw materials. In the EC, where wheat is a market-supported commodity, the effects can be observed by converting national prices to the green currency rate.[8] Wheat quality differences pose a major hurdle that was not solved and should be kept in mind when interpreting the results.

The currency situation relative to the real exchange rate is also a factor. A currency is "overvalued" if the nominal rate of exchange exceeds the PPP exchange rates. Ratios shown in table 1 (global PPP/nominal exchange rate, or NER) give some information about the relative values of currencies over the period. The German, French, and Dutch currencies are overvalued; the British, Greek, and

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[6] It should be noted that the period under study, 1984-86, is unusual because of the very high value of the dollar compared with European currencies.

[7] Even this ratio is sensitive to the exchange rate, which influences the price of imported inputs. Moreover, in the EC, the output price is set in ECU's. When expressed in PPP's, the wheat price is necessarily higher in the countries where the currency is undervalued than in countries where the currency is overvalued.

[8] The green rate of exchange is an administratively determined exchange rate used by the EC to convert agricultural prices from the ECU's to the currencies of the member countries. It was established to ensure uniformity of farm prices throughout the EC despite devaluation or revaluation of individual currencies. (Lipton, 1991). The wheat price index in green ECU's is as follows (EC7 = 1): Germany, 1; France, 0.96; Italy, 1.19; Netherlands, 1.01; United Kingdom, 1.03; Ireland, 0.81; and Greece, 1.16.

Italian currencies are undervalued.[9] [10] Producers in a country whose currency is undervalued benefit if output prices are set in ECU's. Since a unit of wheat will purchase a greater quantity of inputs than in other countries, producers in countries where the PPP/NER ratio is lower than the EC average benefit from cheaper inputs, especially if the input prices are near the GDP-based PPP. This, however, is not true for intermediate inputs that are imported, since undervaluation of currencies increases import prices, or for inputs from the agricultural sector, since their prices are set in ECU's.

Another factor in defining relative prices is the green parities that exist within the EC countries. The suppression of Monetary Compensatory Amounts (MCA) in 1984 has resulted in moving green rates closer to the nominal exchange rates.[11] The MCA's still increased some output prices, especially in Germany in 1984-86 (table 1). Consequences of green rates, however, are not as significant in 1984-86 as they were before 1984.

Market conditions for products directly influence price levels in the EC, even when there are support prices. Since transportation costs are included in the EC target price, government support varies from areas with surplus to areas with deficits. Price variations in intermediate inputs indicate that this sector is generally competitive. The efficiency of the industrial sector that produces inputs can be seen by comparing the average price of the domestically produced inputs and the average price level for imported inputs (ratio of specific PPP's of intermediate inputs to the global GDP-based PPP).

National phenomena, such as interest rates or taxes, affect output prices received by farmers. The combined amount of the VAT balance (the difference between VAT paid on inputs and VAT received on outputs by farmers), different levies and taxes paid by farmers to finance disposal of excess production, and other national taxes (except real estate taxes) can be expressed in proportion to product prices. The share of taxes (VAT) as a percent of product price is as follows: Germany, 1.3; France, -8.9; Italy, -4.9; the Netherlands, -3.9; United Kingdom, -2.6; Ireland, -2.7; Greece, -0.3.

The tax burden on farmers differs from one country to another. The tax ratios are negative (unfavorable to farmers) except in Germany where the tax system, particularly the different VAT rates for outputs and inputs, works as a national subsidy for the farmers. The tax system is most unfavorable to French farmers due to the levies and taxes imposed to finance disposal of excess production. In this study, these levies and taxes are treated as decreases of prices received by the farmers. As a result, all countries except Germany show decreases in output prices.

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[9] "Overvaluation" and "undervaluation" here are relative to the GDP-based PPP. We consider a currency overvalued if the nominal exchange rate (NER) exceeds the PPP rate. This definition may not correspond to the general rule of this term. One must also keep in mind the strong theoretical objections to considering PPP rates as equilibrium exchange rates (Frenkel, 1981). However, this indicator of a currency's situation relative to its real value appears to be more adequate than any other kind of comparison between countries at a comparable level of development (Heston and Summers, 1988).

[10] The PPP/NER ratios are useful when comparing price advantages among the European countries. Since the EC prices are set in ECU's, the country ratio of PPP/NER should be compared with that of the EC (which is 0.82 in table 1); a currency is considered overvalued if its PPP/NER is higher than 0.82. Thus, the German DM is overvalued (PPP/NER=0.96) and the Italian lira is undervalued (PPP/NER=0.76).

[11] The Monetary Compensatory Amount is a tax or subsidy applied to goods traded between EC countries to avoid possible trade disruptions caused by support price differentials that result from different green rates of exchange. For a member country whose green rate is below the market, the MCA applies as a levy on imports and a subsidy on exports; for a member country whose green rate is above the market rate, the MCA has the opposite effect (Lipton, 1991).

Table 1--Exchange rates, purchasing power standard, and green rates (1984-86 average)

Item	Germany	France	Italy	Nether-lands	United Kingdom	Ireland	Greece	EC-7	United States
Exchange rate (NER)	2.17	6.82	1,430	2.48	0.62	0.73	111	1	0.85
Global PPP	2.08	6.05	1,083	2.12	.47	.6	65	.82	.84
Green rate	2.44	6.99	1,484	2.71	.62	.75	103	1	N.A.
Global PPP / NER	.96	.89	.76	.85	.76	.82	.59	.82	.99
Green rate / NER	1.12	1.02	1.04	1.09	1.00	1.03	.93	1	N.A.

N.A. = Not available.

Relative Prices in Different Countries

The index of output and input prices show significant differences among countries (table 2). This suggests that American farmers earn more profits per unit of output than European farmers. Although wheat prices received by U.S. farmers (in PPP's) are 15 percent lower than the EC average, they are compensated by the considerably lower (20 percent) input prices.

The index of wheat prices received by farmers in France is lower than in the United States in nominal terms, but almost equal in real value terms (purchasing parity standard--PPS). Direct government payments increase the prices received by U.S. farmers while French wheat prices are depressed by levies and taxes as well as the relative inefficiency of the marketing system.

The prices of intermediate inputs (fertilizers, fuel, lubricants), when expressed in PPP's, are also lower in the United States than in other countries. Machinery repair prices are more expensive in the United States. The user cost of capital in the United States is higher than the European average. French and German prices of capital are more favorable to farmers than the U.S. and British prices due to the subsidized agricultural credit and to the general level of interest rates.

Output price levels (wheat parity/cost parity) are lower in France than in all other countries, except Ireland, due mainly to grain surpluses. Market inefficiencies raise costs in France. For instance, French farmers have to deliver their wheat to government-accredited institutions instead of directly to the elevators for shipping, as in the United States and the United Kingdom. Taxes on cereals reduce prices received by the farmers in France. The overvaluation of the French franc relative to other currencies does not provide any real advantage on input prices compared with other EC countries because the global prices of inputs are close to the EC averages. The output to aggregate input price ratio in France is one of the lowest in the EC.

Intermediate inputs are expensive in the United Kingdom. The undervalued currency and inefficient input sector could be responsible for the higher prices despite domestic oil production (which lowers the share of fuel imports). The user cost of capital remains relatively high, despite direct subsidies to investment (the "capital grant"). High prices of outputs, however, counterbalance these disadvantages.

German producers receive high prices for their products relative to the price they pay for inputs. The value of the German currency relative to the PPP rates helps lower intermediate input prices. It should have also lowered output prices, but this effect was counterbalanced by the green rate and the

Table 2--Index of relative prices of wheat and inputs (1984-86 average)

Item	Germany	France	Italy	Nether-lands	United Kingdom	Ireland	Greece	EC-7	United States
					Index (EC-7 = 1.00)				
Wheat parity or input cost/exchange rate (ECU):									
Wheat	1.15	0.91	1.18	1.08	1.00	0.83	1.09	1.00	1.00
Intermediate inputs	1.07	1.01	.92	1.00	1.01	1.02	.59	1.00	1.01
Land	1.68	1.10	.28	2.12	.51	1.49	.91	1.00	.43
Fixed capital	.94	1.07	.77	1.15	.99	1.62	.79	1.00	1.31
Wages	.84	1.06	1.05	1.65	1.06	.79	.30	1.00	1.10
Total cost excluding family labor	1.10	1.04	.79	1.19	.95	1.20	.68	1.00	.94
Wheat parity or input cost/PPS:									
Wheat	1.01	.86	1.31	1.06	1.12	.83	1.56	1.00	.85
Intermediate inputs	.95	.96	1.02	.98	1.13	1.04	.85	1.00	.86
Land	1.52	1.07	.33	2.13	.59	1.55	1.34	1.00	.38
Fixed capital	.83	1.02	.86	1.13	1.12	1.65	1.14	1.00	1.12
Wages	.71	.96	1.11	1.54	1.13	.76	.41	1.00	.90
Total cost excluding family labor	.97	.99	.88	1.17	1.06	1.22	.97	1.00	.80
Wheat parity/cost parity (PPS):									
Intermediate inputs	1.06	.90	1.28	1.08	.99	.80	1.84	1.00	.99
Land	.66	.80	3.97	.50	1.90	.54	1.16	1.00	2.24
Fixed capital	1.22	.84	1.52	.94	1.00	.50	1.37	1.00	.76
Wages	1.42	.90	1.18	.69	.99	1.09	3.80	1.00	.94
Total cost excluding family labor	1.04	.87	1.49	.91	1.06	.68	1.61	1.00	1.06

MCA's.[12] Subsidized credits reduce the user cost of capital, which explains the overinvestment in German farms. All of these factors explain the high income levels of German farmers.

Agricultural prices are high in Italy and Greece, mainly due to a shortfall of wheat and high import prices. Italian and Greek producers benefit from low-priced intermediate inputs and moderate capital costs. In the Netherlands, though, the cost of land is a major disadvantage. Wage rates in the Netherlands are also higher than in other EC countries, which raises labor input costs.

[12] Green parities and MCA's increase wheat prices in Germany more than in France and the U.K. Over the period, wheat green parity/NER is 1.12 for Germany, 1.02 in France, and 1.00 in the U.K. (table 1).

Unit Quantity Cost Comparisons

Comparisons of productive efficiency are made on the basis of the quantity of aggregate inputs used in the countries to produce a unit (100 kg) of output. This "quantity cost" is the inverse of a cross-country (spatial) productivity ratio. Given the possibilities for substitution among inputs, comparisons of the productive efficiency should be based on all input costs. However, partial productivities are given in order to analyze differences in the country production structures (table 3).

The United States, United Kingdom, and France, the three largest producers, along with Ireland, had the lowest quantity of aggregate inputs used per unit of wheat. The indices of all input costs are similar in those three countries, indicating no one country holds significant technical advantages over the other two. Their ability to compete in the world market is explained more by the differences in input prices, transportation costs, and exchange rates than by technical advantages at the producer level.

Similar performances are observed only when family labor is included in determining total cost of production. If family labor is excluded, France appears to have lower unit quantity costs since most farms in France are small-sized family enterprises. In contrast, U.S. farms are larger and have low per-unit family labor costs. As such, the unit quantity cost without family labor is high in the United States.

Although the quantity of aggregate inputs is similar, each country uses a different combination of inputs, especially in terms of land and labor. The average yield of wheat is 2,100 kilograms per hectare in the United States and 7,100 kilograms per hectare in the United Kingdom. This means that the United States uses three times more land to produce a unit of wheat than the United Kingdom. On the other hand, total labor (family and hired) used is lower in the United States than in France or the United Kingdom.

Table 3--Index of unit quantity cost per 100 kilograms of wheat production (1984-86 average)

Item	Germany	France	Italy	Netherlands	United Kingdom	Ireland	Greece	EC-7	United States
				Index (EC-7 = 1.00)					
Intermediate inputs	1.06	0.95	1.00	1.27	0.99	0.95	1.54	1.00	0.99
Land	.98	.98	1.35	.80	.84	.94	2.20	1.00	2.82
Fixed capital	1.07	.97	1.02	1.28	.97	.57	1.26	1.00	.96
Labor	.96	.60	4.19	.41	.56	.53	3.54	1.00	.23
Total cost	1.00	.85	2.12	.93	.85	.73	1.96	1.00	.85
Total cost without family labor	1.05	.92	1.04	1.13	1.08	.84	1.41	1.00	1.08

Although U.S., U.K., and French production methods are different, the quantity of intermediate inputs and fixed factors are almost identical in the three countries. France appears to use more fertilizer (per unit of wheat produced) than the United States and the United Kingdom, possibly because of the greater response by wheat to fertilizers in France. British yields, however, are higher than French yields, reflecting a more efficient use of intermediate inputs. The United States consumes more fuel per unit of wheat than the other two countries. The quantity of capital per unit of wheat is similar in the United States, the United Kingdom, and France, although it is higher on a per-hectare basis in the United Kingdom and France than in the United States. The high level of mechanization (or the capital investment) is compensated in France and the United Kingdom by the high yield.

Among the EC countries, the average British farm is twice as large as the average French farm. This structural advantage is only partially reflected in labor productivity (Butault, 1988). Despite the size advantage, the amount of labor per unit of output in the United Kingdom is not much lower than in France.

Ireland is almost as efficient as the United Kingdom in wheat production. German wheat producers suffer from low labor and capital productivity due to the small size of farms and over-mechanization. In Italy and Greece, low yields combined with the amount of labor per unit of output generate low levels of productivity.

Costs of Production Revisited

Table 4 presents the costs of wheat production converted into a common currency (ECU, using nominal exchange rates) and into the Purchasing Parity Standard (PPS), using global PPP based on the GDP of each country. The relative positions of the currencies during the period was unusual, especially the position of the dollar compared with the European currencies. Since the PPS is considered a long-term exchange rate, the costs in PPS give a better idea of competitiveness.

The total cost per unit of wheat production is lowest in the United States, much lower than for its two major competitors, France and the United Kingdom. The cost differences are wide, especially when PPS is used as a conversion rate. The gaps are important determinants of competitiveness, and clearly the expression of costs in PPS gives a better understanding of the real costs than in ECU.

According to economic theory, the input combinations used in production are dependent on relative prices of the inputs. Generally, a high relative input use is correlated with a relatively low price of the input. If elasticities of demand for inputs are high, the low relative input prices will not reduce the share (in value) of this input in the cost of production. The quantity of input per unit of output ("quantity cost") can influence production costs (in value) more than the input prices can. Even if the prices of inputs are low, in countries where the quantity costs are high, the production costs can remain high. On the other hand, the opposite may be true. For example, high prices of land (table 2) prevent the Netherlands from being competitive, despite low quantity costs (table 3).

With the exception of the Netherlands, unit costs generally follow the same direction as productivity, which largely determines competitiveness. Productivity of wheat in the United States, the United Kingdom, and France is higher than in other countries (table 3), with the exception of Ireland, which is not an important producer. These productivity advantages are shown in terms of costs of production in table 4.

The comparison of unit quantity costs (table 3) and costs in value (table 4) shows that, although the quantities of inputs used to produce one unit of wheat are the same in France, the United Kingdom, and the United States, the United States has the lowest costs of production. Lower input prices (table 2) and the low price of land in the United States (relative to the global PPP) provide important advantages in reduced costs of production, even though the quantity of land per unit of wheat is higher in the United States than in France and the United Kingdom. Another U.S. advantage is the lower price of intermediate inputs, in particular, fuel (which is much cheaper in the United States than in Europe) and fertilizers.

If we focus on the ability to compete in a market, the costs of production in value are more relevant than the quantity costs. U.S. wheat is more competitive at the farmgate level owing mostly to low input prices. With technical determinants more or less similar in the three countries, the input and output price differences in the countries provide the United States the edge in wheat competitiveness.

Despite the significant differences in prices paid by European farmers (table 2), prices do not fundamentally change the ranking of the countries among the major EC producers. The most productive countries in the EC are the ones with lower costs. Costs of production (in value) are high in Germany and Italy. In Germany, low user cost of capital due to subsidized agricultural credit does not compensate for low productivity of capital. In Italy, the quantity of labor used has not adjusted to increased labor costs. Excess labor is still used in agriculture, though the wage rates have increased over the last decade and now tend to match rates in northern European countries.

Table 4--Price and cost of production per 100 kilograms of wheat (1984-86 average)

Item	Germany	France	Italy	Nether-lands	United Kingdom	Ireland	Greece	EC-7	United States
					ECU				
Price	20	15.9	20.6	18.9	17.5	14.4	19	17.4	17.4
Intermediate input	8.8	7.5	7.1	9.9	7.8	7.6	7.1	7.8	7.4
Fixed capital	3.4	3.5	2.7	5	3.3	3.1	3.4	3.4	4.3
Land	2.9	1.9	.7	3	.8	2.5	3.5	1.8	2.1
Hired labor	1	.3	.9	.9	2.4	.8	.3	1	.4
Family labor	4.2	4.1	21.2	3	1.3	1.9	7.4	4.9	1.4
Total cost	20.3	17.3	32.6	21.8	15.6	16	21.7	18.8	15.5
					PPS				
Price	20.9	17.9	27.2	21.9	23.2	17.2	32.3	20.7	17.6
Intermediate input	9.2	8.5	9.4	11.5	10.3	9.1	12.1	9.2	7.5
Fixed capital	3.5	4	3.5	5.8	4.3	3.8	5.7	4	4.3
Land	3	2.1	.9	3.5	1	3	5.9	2	2.1
Hired labor	1.1	.3	1.2	1.1	3.2	1	.5	1.2	.4
Family labor	4.3	4.6	28	3.5	1.7	2.3	12.6	5.9	1.4
Total cost	21.2	19.5	43	25.4	20.7	19.1	36.8	22.4	15.7

Returns on Family Labor: Income Per Worker

Most farms in Europe are family farms. Returns to family labor are determined by prices and farm efficiency, and can both reflect and influence national competitiveness. France, the United Kingdom, and the United States have low costs of production and their productivity rankings are not fundamentally altered by differences in input prices. The situation, however, is very different in terms of agricultural incomes as the price system is a major determinant of returns to family labor. For instance, countries with high technical efficiency (productivity) can have low returns to family labor due to the combined effects of high prices of inputs and low prices of outputs.

Table 5 shows the returns to family labor from wheat production. It does not indicate the total income of the farmer, but only the net agricultural income earned from wheat production.

The index of income based on nominal exchange rates is not a useful indicator of the farmers' real income. The index using the global PPP (the PPS based on GDP) is a better indicator of real income since it adjusts purchasing power of family income for differences in the general price levels in each country. Returns to family labor are higher in PPS than in nominal rates (table 5). The incomes of Italian and Greek farmers are low, but not as low as they look when converted into a common currency in nominal exchange rates. The British farmers also have higher real incomes than nominal incomes. On the other hand, American, German, and French farm incomes adjusted for differences in general price levels are not much different from those expressed in nominal currencies.

Farmers in the United Kingdom and the United States generate high returns to family labor from wheat production because their farms are very large compared with the European average. Though the productivity of labor on a per-unit-of-output basis is not always higher (for instance, France and the United Kingdom have similar labor productivity), production per family worker is much higher on American and British farms than in France because of farm size. Thus, even if income per 100 kilograms of wheat were comparable, the larger amount of production on the farm generates higher incomes per family worker in the United Kingdom and the United States.

Another explanation of the income differences comes from the prices faced by the farmers in these countries. Though productivity is similar in the three countries, U.S. farmers benefit from cheaper inputs and U.K. farmers benefit from higher output prices than French farmers do.

Table 5--Net agricultural income per family worker in ECU and PPS (1984-86 average)

Item	Germany	France	Italy	Nether-lands	United Kingdom	Ireland	Greece	EC7	United States
					(ECU)				
Nominal	8,126	7,446	3,578	326	28,690	3,132	2,182	6,489	29,223
Index (EC-7 = 100)	125	115	55	5	442	48	34	100	450
					(PPS)				
Real	8,492	8,392	4,726	379	38,114	3,755	3,707	7,868	29,565
Index (EC-7 = 100)	108	107	60	5	485	48	47	100	376

The impact of prices on net agricultural incomes can be seen by comparing incomes per family worker in France and Germany. Though German farmers are less productive and have smaller farms than French farmers, Germans earn higher incomes per family worker because German input prices are relatively low and output prices high (table 4). The tax system has an important contribution too: the difference between the VAT paid and received equals almost a quarter of the farmer's income. These figures clearly show the important effects of the price system on incomes.

High prices of wheat in Greece and Italy partially compensate for poor productivity and high costs of production. Nevertheless, net agricultural incomes in these countries are lower than the EC average because of the larger supply of labor.

Due to the high price of land and the small size of farms, wheat production is not profitable in the Netherlands. The country is not an important wheat producer and has other specialized crops that generate higher value added per hectare than wheat does.

Conclusions

Cross-country comparisons of costs of production can illuminate international competitiveness, provided that the data are consistent. This report describes a procedure for comparing costs of production using existing data from different countries. Real value comparisons of production costs can be made, however, only if data are converted to a common currency based on specific purchasing power parities instead of nominal exchange rates.

Aside from the methodological advances, the report also investigated competitiveness in wheat production among EC countries and the United States. The productivity levels in the wheat sectors of the United States, United Kingdom, and France appear quite similar, even though costs of production are different. This suggests that competitiveness among these three countries is determined more by the domestic market and economic conditions than by the technical determinants of wheat production. Prices of inputs and outputs, exchange rates, and the efficiency of transportation and marketing sectors are major determinants of competitiveness.

Absolute costs of production appear much lower in the United States than in France and the United Kingdom, especially if we consider the global PPP as an average long-term exchange rate, because the prices of land and intermediate inputs are lower in the United States. Other EC countries, with the exception of Ireland, have higher costs than France and the United Kingdom.

Within the EC, there are differences in national prices despite the Common Agricultural Policy. Prices of inputs could reflect differences in the efficiency of the input industry and performance of the national economy. Sometimes, however, there can be artificial inequalities created in the system, as with subsidized credit and subsidies through VAT rates. The output prices reflect mainly market conditions and efficiency.

Relative price differences have a substantial effect on relative agricultural incomes. Among the major producers, low costs of production generate high agricultural incomes per worker in the United States and United Kingdom compared with other countries. France suffers from lower output prices than the EC average and a relatively inefficient marketing sector. In some other EC countries, however, prices received are sometimes enough to overcome relatively high costs of production and generate high farm incomes.

Finally, the United States appears more competitive among the wheat producers because of its low input prices. Prices are more important than technical efficiency in providing higher agricultural incomes. Lower costs of production, larger farm sizes, and higher incomes suggest that the U.S. wheat sector has a greater capacity to bear a decrease in wheat prices than the French or British. In other words, compared with many European countries, the United States holds a stronger position in the wheat sector due to its better market conditions.

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Appendix--Comparison between U.S. and EC Methods of Calculation

Seeds

Value U.S.: Multiplies farmer-reported seeding quantities by State average seed prices. Source: ERS-USDA.

Value EC: Enterprise values allocated by OLS method from FADN-reported farm expenses on seed.

PPP: Calculated on the basis of average prices of wheat seeds at the producer level. Price exclusive of VAT in Europe. Sources: NASS and Eurostat.

Fertilizer

Value U.S.: Multiplies farmer-reported quantities of nutrients applied by State average prices per pound of primary nutrients. Source: ERS-USDA.

Value EC: Enterprise values allocated by OLS method from FADN-reported farm expenses on fertilizers.

PPP: Weighted average of unit prices of primary nutrients. Prices exclusive of VAT in Europe. Sources: NASS, national sources, and Eurostat.

Fuel, lubricants

Value U.S.: Producers report data on machine size, age, and area covered. These data are combined with engineering specifications of speed and field efficiency to arrive at hours per acre. The hours per acre are multiplied by fuel consumption per hour and fuel price to determine fuel expense per acre. Lubrication costs are calculated at 15 percent of fuel expenses (electricity is not taken into account but aggregated, whatever its use, in the other goods and services).

Value EC: Enterprise values allocated by OLS method from FADN-reported farm expenses on fuels and lubricants.

PPP: Calculated on the basis of the average prices of diesel fuel, excluding VAT and national tax exemptions for farmers. For France, the prices include the "nondeductible VAT." Sources: NASS and Eurostat.

Building repairs

Value U.S.: Estimates made by separating charges for repairs into building and machinery repairs. The building repairs are estimated to be 20 percent of the total repairs in the wheat sector. Source: ERS.

Value EC: Enterprise values allocated by OLS method from FADN-reported farm expenses on building repairs.

PPP: PPP's for the dwelling repairs (corrected for VAT) are obtained from OECD.

Machinery repairs

Value U.S.: A repair rate per machine is calculated based on engineering relationships for each machine, which is divided by the number of hours the machine is used on a particular crop. Source: ERS-USDA.

Value EC: Enterprise values allocated by OLS method from FADN-reported farm expenses on fuels and lubricants.

PPP: Weighted geometric averages of United Nations PPP's for vehicle repairs and for tires (unpublished data provided by SOEC), corrected for VAT.

Other goods and services

Value U.S.: Sum of costs of different items rearranged to match the EC list of items, such as lime and gypsum, electricity (for irrigation and farm use), chemicals, hired machinery custom operations, purchased irrigation water and nonirrigation water for farm use, telephone for farm use, soil testing and other technical services, office equipment and supplies, farm share of motor vehicle registration and licensing fees, accounting charges, business travel, and dues for membership in farm organizations. Source: ERS (FCRS survey for lime and gypsum; FCRS farmer-reported expenses of chemicals for wheat; FCRS survey and annual whole-farm questions in FCRS for miscellaneous expenses).

Value EC: Individual farm-reported cash expenses for a list of items--lime and gypsum, electricity, chemicals, hired machinery, water, technical services, office equipment and supplies, vehicle fees, and dues for membership in farm organizations--of the FADN sample are allocated by OLS.

PPP: The GDP-based PPP (corrected for VAT). Source: OECD.

Land

In the EC and the United States, the land cost per 100 kilograms of wheat production has been computed with the physical quantity of land (in hectares) used to produce 100 kilograms of wheat multiplied by a land user cost, which is the sum of cash expenses for land rents (cash equivalent if crop-share system), land interest charges, and land taxes.

Value U.S.: Land quantities come from yields. Interest on real estate comes from whole-farm interest expenses allocated to wheat on the basis of proportion of wheat production in the total output. The interest and taxes on real estate have been disaggregated for land by ERS.

Value EC: Individual farm-reported land rents, land taxes, and interest charges for land allocated to wheat on the basis of wheat production in total output. Source: FADN.

PPP: Implicit PPP calculated using the user cost previously defined (land rents, land taxes, and interest charges) as value and the physical quantity of land per unit of product. Source: ERS and FADN.

Labor

Value U.S.: The total labor is the number of hours worked to produce 100 kilograms of wheat (NASS). Total hours are then divided into paid and family labor based on a proportion of labor paid at a cash wage on all crop farms. In both cases, the value of labor is then estimated by multiplying the hours worked by the State wage rate for farm labor. Source: ERS.

Value EC: Hired labor expenses reported to FADN by the producers are allocated to wheat on the basis of the share of wheat in the gross margin of the farm. For family labor, the number of hours worked are derived from the Unit Annual Workers in the FADN and allocated to wheat on the basis of the gross margin. The value of family labor is obtained by multiplying the quantities by the average regional wages of hired labor. Source: FADN.

PPP: Calculated on the basis of wage rate per hour in the agricultural sector. Source: ERS and FADN.

Capital

Value U.S.: Economic depreciation plus interest paid (except land interest charges). Source: ERS.

Value EC: Economic depreciation of capital plus interest (except land) expenses of the farm allocated by OLS method.

PPP: Weighted average of the United Nations PPP's on buildings and agricultural machinery investment goods. An implicit PPP is computed by taking the value (depreciation and interest paid) of the costs and depreciation as a volume.

Wheat

Value U.S.: The value per 100 kilograms of wheat is calculated from the cash receipts of wheat at the national level (ERS, Farm Sector Analysis Branch), plus the direct payments to wheat (National Financial Summary, ERS) divided by the quantities marketed (ERS, FSAB). Thus, the price includes all direct payments to wheat (deficiency payments, diversion payments, and disaster payments).

Value EC: The unit value of wheat is the price received by farmers, which includes the market support price (FADN), less the producer taxes (except land taxes) and corresponding levies paid by the producers to finance disposal of excess production. These prices are corrected for VAT. When the VAT system is not neutral to the farmer (that is when farmers receive more than what they pay, or pay more than what they receive, due to forfeit system or to different VAT rates on the inputs and outputs), the difference between the VAT paid and received is divided by the quantities marketed and added to (or subtracted from) the price.

PPP: Calculated for unit values.

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