Competitiveness in the World Sugar Industry:
A Comparison of the EU and U.S. Sugar Sectors

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Introduction

Sugar beets are produced in both the United States (U.S.) and the European Union (EU) with combined production placing these regions among the world’s top producers of sugar beets (USDA-FAS, 1997). Sugar beets are grown in 14 states within the United States, accounting for about 50 percent of total U.S. raw sugar production, with Minnesota, Idaho, and California leading all other states (USDA-ERS, various issues). Sugar beets are produced in nearly all countries in the EU with France, Germany, Italy, and the United Kingdom accounting for about 40 percent of the total production (European Commission, 1997). At the same time, Belgium, the Netherlands, the United Kingdom, and the United States are among the world’s most efficient producers of beet sugar as measured by cost of producing raw sugar (USDA-ERS, 1998).

To a large extent, sugar is either consumed in the country where it is produced under government pricing schemes or exported from one country to another under prearranged agreements (Hannah and Spence, 1997). Sugar that is not produced under these conditions is freely traded. The free, or residual, market for sugar is typically 20-25% of world production (Hannah and Spence, 1997). This implies that a small increase in world sugar production results in a proportionately large increase in the free market supply of sugar, contributing to the volatility of world sugar prices.

The EU and U.S. sugar industries have historically been insulated from volatilities in the world sugar market through the use of import restrictions. As a result, the domestic price of sugar in these regions has been supported at levels above the world price. In addition to providing benefits to domestic sugarcane and sugarbeet producers, these policies have served to provide gains to producers of substitute products, such as high-fructose corn syrup.
Potential reform in the international agricultural policy arena has highlighted the need to examine the competitiveness of the European Union and United States sugar industries. On the part of the European Union, developments with respect to international agricultural policies will affect the competitiveness of its sugar industry. The trend toward trade liberalization under the auspices of the World Trade Organization (WTO) and the friction between the EU and various sugar exporting regions with respect to the Lome agreement may serve as a catalyst for EU sugar policy reform. In addition, a recent emphasis by EU officials on restructuring the Common Agricultural Policy (CAP) indicates that the current environment may be conducive to trade liberalization. For the U.S., the North American Free Trade Agreement (NAFTA) (USDA-FAS, 1998) and the Uruguay round of the General Agreement on Tariffs and Trade (GATT) with the resulting WTO (USDA-FAS, 1994) have resulted in U.S. commitments to reduce sugar protection. This, combined with a restructuring of United States domestic agricultural policy (Young and Westcott, 1996) has begun to reconstruct the environment in which the United States sugar industry operates.

U.S. sugar producers will be affected by changes in agricultural policy necessary to comply with commitments made in the Uruguay round of GATT (USDA-FAS, 1994). This includes replacing the current tariff-rate quota for sugar with a tariff equivalent equal to seventeen cents/lb, raw value, to be reduced to the required 14.45 cents/lb minimum by the year 2000. Market access will be increased by establishing a tariff-rate quota of 1,139,195 tons for sugar effective in the first year of the agreement. In addition, the Section 22 fee of one cent/lb for refined sugar and syrups will be reduced by the minimum required 15% over 6 years. These actions all serve to increase world access to the U.S. market.
Given these projected and potential changes, how are the various regions and sectors of the EU and U.S. sugar industries positioned to compete in the world market? This paper seeks to answer this question by, first, outlining an analytical framework to examine the impact of various sources that influence competitiveness in the sugar industry and identify several indicators of competitiveness. The paper then proceeds to utilize these indicators in order to determine the competitive position of five countries: France, Germany, Italy, the United Kingdom, and the United States. The paper concludes by providing several implications for the beet sugar industry as they prepare to compete in this new policy environment.

**Analytical Framework**

Agribusiness competitiveness has become a topic of much discussion in both the popular press and in academic literature. Yet even though the term competitiveness is used in many circles, it remains an ambiguous concept. What is meant by the term competitiveness? More importantly, what are the factors that contribute to the competitiveness of agricultural industries? This section of the paper provides an overview of the appropriate measures of competitiveness.

Competitiveness has been addressed from a number of different perspectives (Kennedy et al., 1997). Some have defined competitiveness as the ability to sustain an acceptable growth rate and real standard of living (Landau, 1992). This definition is linked to a nation’s employment and, consequently, the standard of living of its citizens. However, the level of national employment, growth of employment, and the standard of living in an economy depend on the competitiveness of firms within the country. Analyzing a nation’s competitiveness requires that the underlying factors that influence the competitiveness of individual firms and industries be examined (Porter, 1990).
Consequently, this paper defines competitiveness as the ability of a business to profitably create and deliver value at prices equal to or lower than those offered by other sellers in a specific market.

Agribusinesses become more competitive by creating value through cost leadership and/or product differentiation (Porter, 1980). More specifically, technology, attributes of purchased inputs, product differentiation, production economies, and external factors are the primary sources of competitiveness (Harrison and Kennedy, 1997). Each of these factors affect a firm’s costs and the degree to which it can differentiate its products. These sources also affect profits and market share.

*Technology* – Cost advantage can be achieved through proprietary technologies that affect the productivity of labor and capital. The development and adoption of these technologies affect the firm in several ways. The impact of employing new methods depends, to a large extent, on firm behavior and industry structure. For example, a productivity-enhancing technology enables the firm to lower production costs. Other technologies allow the firm to increase its quality of output given an initial set of inputs.

It is important to note the primary difference between productivity-enhancing and quality-enhancing technologies. A technology is *productivity-enhancing* if its adoption enables the firm to decrease its costs per unit of output. On the other hand, a technology is *quality-enhancing* if its adoption enables the firm to increase quality per unit of input. Despite the inclination to categorize technology as either productivity-enhancing or quality-enhancing, there are many technologies that cannot be pigeonholed into just one classification. The existence of technologies that are both productivity- and quality-enhancing, combined with the effects of firm behavior, imply that cost and quality factors both affect firm competitiveness.
Input Costs – Costs are also influenced by the price, quality, and dependability of purchased inputs. This is one of the most direct and obvious sources of competitiveness. Even so, it is difficult for a firm to attain an advantage in this area. To illustrate this point, consider two coffee processing plants. Suppose coffee beans compose the same share of production inputs for two companies and that the cost of coffee beans declines. This decrease in the cost of coffee beans affects both firms in the same way. However, it does not change either firm’s cost of production relative to the other. To gain a competitive edge, a firm must lower input costs relative to those incurred by rival firms. The resulting cost advantage influences the relative competitive advantage of the firms.

Scale Economies – Production efficiency can be improved through scale economies and broadening the scope of production. A firm’s efficiency increases when plant size is adjusted in a way that decreases average costs of production. The increased size of these firms reduces total costs through a greater division of labor, resulting in increased competitiveness. Economies can also be achieved by broadening the scope of products that a firm produces. The firm’s scope can be adjusted to produce a wide variety of products that are close substitutes in the production process. Thus, economies of scope permit the firm to spread the cost of its fixed assets over additional lines.

External Factors – There are a number of external factors that influence the competitiveness of agribusiness firms and industries. Government policies can affect an industry’s competitiveness in both domestic and international markets. Lower priced inputs lead to lower costs for the downstream firms and an increase in their competitiveness relative to foreign rivals. Government policies also affect an agribusiness firm’s ability to obtain world market share. This acts to expand the subsidized industry’s world market share. Macro-economic variables, such as exchange rates, consumer incomes, and population growth also influence the competitiveness of the firm. Although individual
firms have little influence on the exchange rate, they benefit from increased profits and market share. Thus, government policies and other factors beyond the firm’s control impact competitiveness.

**Competitiveness Trends in the EU-U.S. Sugarbeet Industries**

Four EU countries (France, Germany, Italy, and the United Kingdom) and the United States are examined in this analysis. The previously specified framework will be used to examine the factors that affect competitiveness levels within the sugarbeet industry. As opposed to focusing on absolute levels of competitiveness, this analysis will examine changes in various sources of competitiveness and their impact on the relative competitiveness of countries.

**Data & Methods**

The data used for this analysis are reported as annual costs of producing and processing raw sugar, which were disaggregated into labor, capital, and fuel costs per metric ton of sugar (LMC, 1997). The data were provided by LMC International, Ltd., which uses an engineering approach to develop production and processing costs on a consistent basis. This approach requires details of the physical inputs used in production within the respective countries or regions, and applies local prices to derive the input costs. Costs were computed separately for three distinct stages of the production process. Field costs cover production from seed planting through delivery of the sugar beets to the processing plant. Factory operations carried the production process to the delivery of refined white sugar into storage at the factory.

More specifically, capital inputs were calculated on the basis of replacement costs. Depreciation charges were computed using the straight-line method. Real interest rates were used to avoid giving an apparent cost advantage to a country with a low inflation rate. The real interest rate was set at a positive 2 percent per annum for all countries, meaning that each country’s nominal
interest rate was set at 2 percent above its rate of price inflation. The application of this 2 percent rate assumes that every country’s costs remain fixed at the levels prevailing in the year under review. Hence, costs for a particular year are all calculated in constant prices for that year without any allowance for future inflation. Wherever possible, national estimates of sharecropping rental rates were used to determine the value of land rentals. The sugar is assumed to be in bulk and is costed the moment it enters the warehouse, without any allowance for distribution or marketing costs. Finally, official exchange rates were used to convert values to U.S. dollar terms.

The data are used to estimate average annual changes in production and processing costs for the selected countries over the 1979/80 to 1994/95 study period. Production and processing costs are decomposed into labor, capital, and fuel costs for each country. The model is as follows:

\[ C_{ijt}^k = \alpha_{ij}^k + \beta_{ij}^k T + \epsilon_{ijt}^k \]  

where, \( C_{ijt}^k \) is the \( i \)th cost (i.e., labor, capital, and fuel costs) for country \( j \) in time period \( t \) and \( k \) represents the production or processing sector. \( T \) is a time trend variable. Therefore, the parameter \( \beta_{ij}^k \) measures the average annual change in the \( j \)th country’s \( i \)th cost component.

Trends for total costs are estimated using the following model:

\[ C_{jt}^k = \alpha_j^k + \beta_j^k T + \epsilon_{jt}^k \]  

where, \( c_j^k = \sum c_{ijt}^k \) and \( T \) is as previously defined. The parameter \( \beta_j^k \) measures the average annual change in total costs for country \( j \). Therefore, the relative contribution of cost component \( i \) to the trend in total costs is given by the absolute value of the expression \( \beta_{ij}^k / \beta_j^k \). Models 1 and
2 were estimated using ordinary least squares regression. The parameter estimates and relative cost contributions for each country and sector are presented in Tables 1 and 2.

**Results**

*France* – The French production sector experienced statistically significant increases of $8.15 per year in total costs over the study period. Rising fuel costs account for most of this with average annual increases of $3.93 per ton, which is approximately 48 percent of the increase in total costs. The French processing sector also experienced a significant increase in total costs over the study period. The majority of this increase can be attributed to a $7.28 per year increase in labor costs, which grew 112 percent per year relative to the overall trend. Increasing labor costs were partially mitigated by a 25 percent per year reduction ($1.61 per year) in fuel costs over the study period. This resulted in an increase in total costs of $6.47 per year for the processing sector. The combined effects of production and processing sectors contributed to a $14.62 per year increase in the total cost of raw sugar production in France over the 1979/80 to 1994/95 period (Tables 1 and 2).

*Germany* – Like France, German beet farmers experienced significant cost increases in all factors of production over the study period. The combined effects of increases in labor, capital, and fuel costs resulted in an average annual increase of $8.40 per ton of raw sugar. Of this total, 46 and 41 percent of the change was attributed to increases in fuel and labor costs, respectively. The German processing sector also had significant cost increases ($6.94 per year). Of this total annual increase, labor costs increased an average of $10.45 per year, but were offset by an average decrease of $3.46 per year in fuel costs (Tables 1 and 2). Combined production and processing sectors show that total costs for the German raw sugar industry increased by an average $15.34 per year over the sample.
Italy – Italy has experienced the largest increases in production costs relative to its European neighbors with significant increases of $20.60 on average per year. The largest contribution to this increase can be attributed to rising labor costs, which accounted for 51 percent ($10.55 per year) of the total over the study period. The Italian production sector also had significant increases in capital and fuel categories as well ($3.61 and $6.44 per year, Table 1). However, unlike France and Germany, the Italian processing sector had significant reductions in capital costs over the sample period ($7.44 per year, table 2), which were offset by increased labor costs ($7.62 per year, Table 1). The combined result is that total processor costs changed very little over the 1979/80 - 1994/95 period of analysis. Consequently, the competitiveness of Italy’s processing sector has improved relative to France and Germany, largely because of reduced capital costs. Nevertheless, the combined effect of production and processing resulted in the highest net increases among all sugarbeet countries ($19.78 on average per year, Tables 1 and 2).

The United Kingdom – The United Kingdom’s production sector had no significant changes in costs over the study period (Table 1). Consequently, the UK production sector’s competitiveness has improved relative to France, Germany, and Italy. The processing sector had significant increases in labor costs ($4.91 on average per year, Table 2), while both capital and fuel costs declined significantly over the sample period ($2.10 and $3.04 per year, Table 2). The combined effect of increased labor costs and decline capital and fuel cost resulted in little change in total processing costs. Therefore, like Italy the UK processing sector has improved its competitiveness relative to France and Germany. However, the U.K. also experienced insignificant change in the production sector, implying little change for the entire sugar beet industry. Hence, the UK sugar beet industry has improved in overall competitiveness relative to its European neighbors.
The United States – The United States sugar beet production sector has had moderate increases in labor costs over the sample period ($1.47 on average per year, Table 1). These cost increases were offset by decreases in capital costs averaging $1.73 per year over the study period. The net effect was very little change in US production sector costs, and consequently an improvement in the US competitiveness relative to France, Germany, and Italy. Similarly, the US sugar beet processing sector had significant reductions in labor, capital, and fuel costs over the study period, the most dramatic of which occurred in the capital and fuel categories (Table 2). The combined reduction in these costs led to an average reduction in total processing costs of $4.03 per year, and a net reduction of total industry costs of $4.41 per year on average (Table 2). Therefore, the competitiveness of the US sugar beet industry has improved relative to all other selected countries during the study period.

Implications and Conclusion

While this study does not report the overall competitiveness levels of the five countries analyzed, it does provide information as to changes in relative competitiveness. Specifically, the relative competitiveness of the U.K. and the U.S. production sectors has increased relative to the other countries analyzed. Combining its competitiveness gains in the production sector with gains in the processing sector, the U.S. has enhanced its position relative to the other countries.

Given the results of this analysis, it is apparent that determining competitive advantage is an elusive goal. Competitiveness gains with respect to one source are often negated by losses with respect to another. At the same time, these sources are influenced by a number of underlying, and often divergent, factors. Future research specifying in more detail the factors influencing each source of competitiveness will be useful in answering questions as to how and why competitive advantage has shifted in the sugar industry.
References


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Note: Numbers in parentheses are t-statistics and \( R^2 \), respectively.

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