Significant Determinants of Price for EU Product Denomination of Origin Cheeses

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Michael Boland, John Crespi,
Déborah Sanchez, and Tian Xia
Kansas State University

Motivation

- In 1992 the EU established PDO (Protected Designation of Origin) and PGI (Protected Geographical Indication) labels for all agricultural products
- Products with PDO names have inherent characteristics resulting exclusively
  - Terrain (air, climate, land and native species)
  - Producers' know-how
- Object of much debate and research in the last five years
  - Over 15 papers in the literature looking at welfare impacts and other aspects

Objective

- First empirical paper looking explicitly at this topic with regard to a single commodity, cheese.
- The objective is to analyze the impact of
  - Supply control variables such as quantity
  - Cheese hedonic quality attributes such as country of origin, type of milk, and age, and
  - The price of substitutes such as US artesian and farmstead cheeses on the price of imported cheeses.
- On the price of EU cheeses imported into the US

Collection of the Data

- An electronic survey was designed to collect information on EU PDO / PGI's. The languages for the survey included Dutch, English, French, German, Greek, Italian, Polish, and Spanish. A secure website was created whereby respondents could enter the information online or over the telephone.
- The initial survey responses for cheese included 45 from France, 33 (Italy), 20 (Greece), 20 (Spain), 12 (Portugal), 12 (United Kingdom), 6 (Austria), 4 (Germany), 4 (The Netherlands), 2 (Denmark), 2 (Poland), and 1(Belgium, Ireland, and Sweden, respectively). The variable measuring production volume for the PDO (there were no PGI cheeses) could not be found for cheeses from Belgium, Denmark, Germany, Greece, Ireland, Poland, Sweden, and The Netherlands as well as some cheeses from France, Italy, Portugal, and Spain.

Description of the Data

- Complete data on 34 cheeses from France, Italy (21 cheeses), Portugal (7 cheeses) and Spain (21 cheeses) were obtained from a total of 83 observations comprising 51% of all PDO cheeses in the EU but 77.4% of total PDO cheese exports to the United States in 2005.

We wish to thank!

- Michael Lough is an experienced professional in the quality label system in the UK and the contact person for the Beacon Fell Lancashire Cheese.
- Mr. Juan Antonio Espejo Calvo from the Consejo Regulador de la Denominación Especifica del Esparrago de Huérto Tájar is an expert in the PDO legislation. He has worked on it since 1993 and he has promoted 10 PDOs in the south of Spain.
- Mrs. Espejo Calvo introduced and explained very well the different levels of legislation and their contents during further communications. Ms. Emmanuelle Gallienne from Service Consommateurs Société (Roquefort Society Customer Service) provided the official government website for the PDO/PGI statistics in France.

Econometric Model

- P_i is the imported US price paid for each of the i^{th} PDO labeled product (i = 1, … , 83) is a function of
  - Age of the cheese
  - Price of a substitute artesian US cheese
  - Quantity of cheese produced
  - Italian, Portuguese, or Spanish cheeses (relative to French cheeses)
  - Sheep or goat or mixed (relative to cow milk cheeses)
- Estimated in SAS

Results – Quantity Variable

- The regression R^2 is 0.4796 indicating a good degree of fit for this cross sectional data set.

- The variable associated with supply control, quantity, has the expected negative sign which means that for every 1% increase in market share, the PDO cheese price decreases by $0.095 per pound, holding everything else constant.
- We assumed a PDO exports approximately 15% of their production (Asiago, Caciocavallo, Grana Padano, Gorgonzola, Montasio, Parmigiano Reggiano, Provolone, and Ragusano exported this amount in 2005). Therefore, the exports would increase by 2,401,080 pounds (16,007,200 average pounds multiplied by 15%). The economic impact of a one percent increase in quantity represented by an increase in 24,108 pounds in exports leads to a decrease of $2,281 of total revenue of cheese per year. This would be a small loss to producers.

- It must be remembered that producers in a PDO have an inelastic supply curve. Furthermore there is no incentive to increase supply because the know-how or process may limit the introduction of more productive technology. Thus, it is not surprising to see small changes.

Results – Hedonic Quality (Age)

- The estimated coefficient for age is statistically significant at the 90% significant level. As one might suspect, a cheese that is more mature, like wine, has a greater value.
- Age affects positively the PDO cheese price as expected given that most of the cheeses acquire their sensorial characteristics (aftertaste, flavor, odor and texture) during the aging process which differentiates them and makes a particular cheese desired by the consumers.
- The estimated result showed that a 1 year increase in the age leads to $4.23 increase in the PDO cheese price per pound, holding everything else constant.
- The age variable coefficient represents a reasonable magnitude. For example, a 1 year Queso Manchego's per pound cheese price is about $2.24 dollars higher than a 3 month Queso Manchego's cheese price.

Results – Hedonic Quality (Animal)

- The type of milk variables (sheep, goat and mix) are statistically significant at the 85% significance level and while it may be true that consumers are more aware of the final output characteristics (odor, taste, texture, color and smell) rather than in the input type used to produced the cheeses, this significance suggests otherwise.
- The imported cheese market is dominated by cow milk cheeses. The US imported 174,780 tons of cheese made from cow milk. Approximately 19% and 0.05% of the cheese is made with sheep milk and goat milk, respectively, mostly from the EU in 2005

Results – Hedonic Quality (Country)

- The estimated coefficients for Italy and Spain are statistically significant at the 90% significance level. The small representation of Portuguese cheeses in the data base (7 observations) might be causing its insignificance.
- The PDO price per pound of an Italian cheese is $7.72 less per pound compared to a French cheese, holding everything else constant. Spanish cheeses are $9.48 less expensive than French cheeses, holding everything else constant.
- These results are not surprising due to the fact that most of the best known cheeses in the world such as Roquefort, Brie, Banon and Camembert come from France. The economic significance of French cheeses in the international market is higher compared to the other countries. France exported 562,330 tons of cheese followed by Italy (221,240 tons), Spain (57,850 tons) and Portugal (2,620 tons) in 2005.

Results – Price of Substitutes

- The sign on the estimated coefficient on the price of substitutes (artesian or farmstead cheeses) suggests that as expected artesian or farmstead cheeses are substitutes for PDO cheeses.
- Given the nature and differentiation of both types of goods, the results suggest that both cheeses are substitutes. The fact these cheeses are substitutes is reflected in the fact that both cheeses are sold for about the same price in the US. Considering an average PDO cheese price of $21.92 per pound and $21.11 as an average price of a substitute US artesian cheese per pound, the results are consistent with these values.
- Artesian farmstead cheese production has increased significantly in the US since 2003 to almost 900 million pounds in 2006. On per capita basis, consumption of those cheeses have increased five times faster than the total cheese consumption.

Artesian Cheeses

- A survey of 160 cheese makers by the University of Nebraska Food Processing Center in 2007 reported that there were no price leaders in the market which implied that demand is relatively inelastic. In addition, the cheese makers were not worried about imported PDO cheeses.

Implications

- Cheese is a product category in the EU for PDO certification. Most cheeses are not produced in sufficient quantities for export purposes. Thus, it is not surprising that an artesian or farmstead cheese industry has developed in the United States.
- These cheeses have very similar characteristics to PDO cheeses produced in the EU.
- Our empirical results indicate that the economic magnitude of an additional unit of land for the cheese PDO results in a very small incremental increase in price. In addition, French cheeses, greater aging of the cheese, and type of milk matters but it is not as important.
- Trade disputes may occur over certain well recognized PDO cheeses such as Parmesan but, in general, the main EU PDO cheeses are not likely to be affected by US competition.

Table 3. Regression Coefficients, Standard Errors, and Hypothesis Test Results for the Model

Variable	Coefficient	Standard Errors
Intercept	17.48	2.82
Price of Substitute (PS)	0.31*	0.11
Age (AG)	4.23*	2.10
Quantity (QD)	-0.095*	0.05
Italy	-7.72*	2.14
Portugal	-2.96	3.10
Spain	-9.48*	1.98
Sheep	3.19	2.18
Goat	4.48*	1.82
Mix	4.08	2.76

***, **, and * denote significance at the 1%, 5%, and 10%, respectively.

Non Database References

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