

Senior Level “Prices” Research Project
“Price-Quantity Relationship and Profitability in the U.S. Peanut Industry”

Description: The research project objective is to apply the inverse demand framework to analyze price-quantity relationships and profitability in the U.S. peanut industry. This is a take-home research project. It includes an empirical price analysis, which involves estimating a price-dependent demand function for peanuts at the farm-gate level, and an analytical analysis of four market scenarios differing due to peanut quantity produced, peanut price, and industry profit. These market scenarios are a peanut oversupply scenario, a perfectly competitive industry scenario, a small degree of seller market power scenario, and a hypothetical monopoly scenario. The answer key is provided.

Kew words: peanut marketing and pricing, seller market power, regression analysis.

Summary

Student Learning Objectives

SLO #1: Students should learn a theoretical framework explaining seller market power in the U.S. peanut industry and be able to apply this framework to evaluate peanut price-quantity relationships and industry profitability under alternative market scenarios that differ due to peanut quantity produced, peanut price, and industry profit: a peanut oversupply scenario, a perfectly competitive industry scenario, a small degree of seller market power scenario, and a hypothetical monopoly scenario.

SLO #2: Students should be able to apply the theoretical framework to perform an analytical analysis of peanut price-quantity relationships and industry profitability in alternative market scenarios by using the peanut inverse demand and constant marginal cost functions.

SLO #3: Students should be able to use the U.S. Department of Agriculture National Agricultural Statistics Service (USDA NASS 2021) Quick Stats database to collect yearly data on peanut quantity produced and peanut price received by peanut growers and to use these data to estimate a peanut inverse demand function at the peanut growers' level of the peanut supply chain using a regression analysis.

A graphical explanation of the theoretical framework used in this research project is presented in Figure 1. The four market scenarios are explained in Table 1. The theoretical framework and the U.S. peanut industry background are discussed in greater details in Bolotova (2019).

This research project is a take-home project. Students worked in small groups on this project. The theoretical framework was explained in class during a regular class session devoted to the applications of economic models explaining seller market power in agricultural industries (Bolotova 2019). One class session was allocated to introducing the research project. The

instructor explained its structure and provided guidance on data collection. During this class session, students downloaded data from USDA NASS Quick Stats database, prepared an Excel file to be used in regression analysis, and estimated the inverse demand function for peanuts using the OLS estimation procedure. Students checked the estimation results with the instructor at the end of the class session to make sure that the estimated inverse demand function for peanuts to be used to complete the project is correct. Many students used Excel to estimate the inverse demand function. Some students used a software program of their choice, which they used in other classes where they learned regression analysis.

Research Project Items

1. PDF file: Research Project. The file's name is "AETR_OTD_00002 Peanut Research Project AETR OTD Research Project."
2. PDF file: Research Project Answer Key with required attachments. The file's name is "AETR_OTD_00002 Peanut Research Project AETR OTD Answer Key."
3. Excel file with data downloaded from the USDA NASS Quick Stats Database (Sheet 1), data set prepared to be used in the regression analysis (Sheet 2), and the OLS estimation results (Sheet 3). The file's name is "AETR_OTD_00002 Peanut Research Project AETR OTD Data and Results."

References

- Bolotova, Y. 2019. Teaching Competition Topics: Applications of Seller Market Power in Agricultural Industries. *Applied Economics Teaching Resources* 1: 43-63.
- <https://ageconsearch.umn.edu/record/300072?ln=en>
- U.S. Department of Agriculture National Agricultural Statistics Service (USDA NASS). 2021. Quick Stats Database. <https://quickstats.nass.usda.gov/>

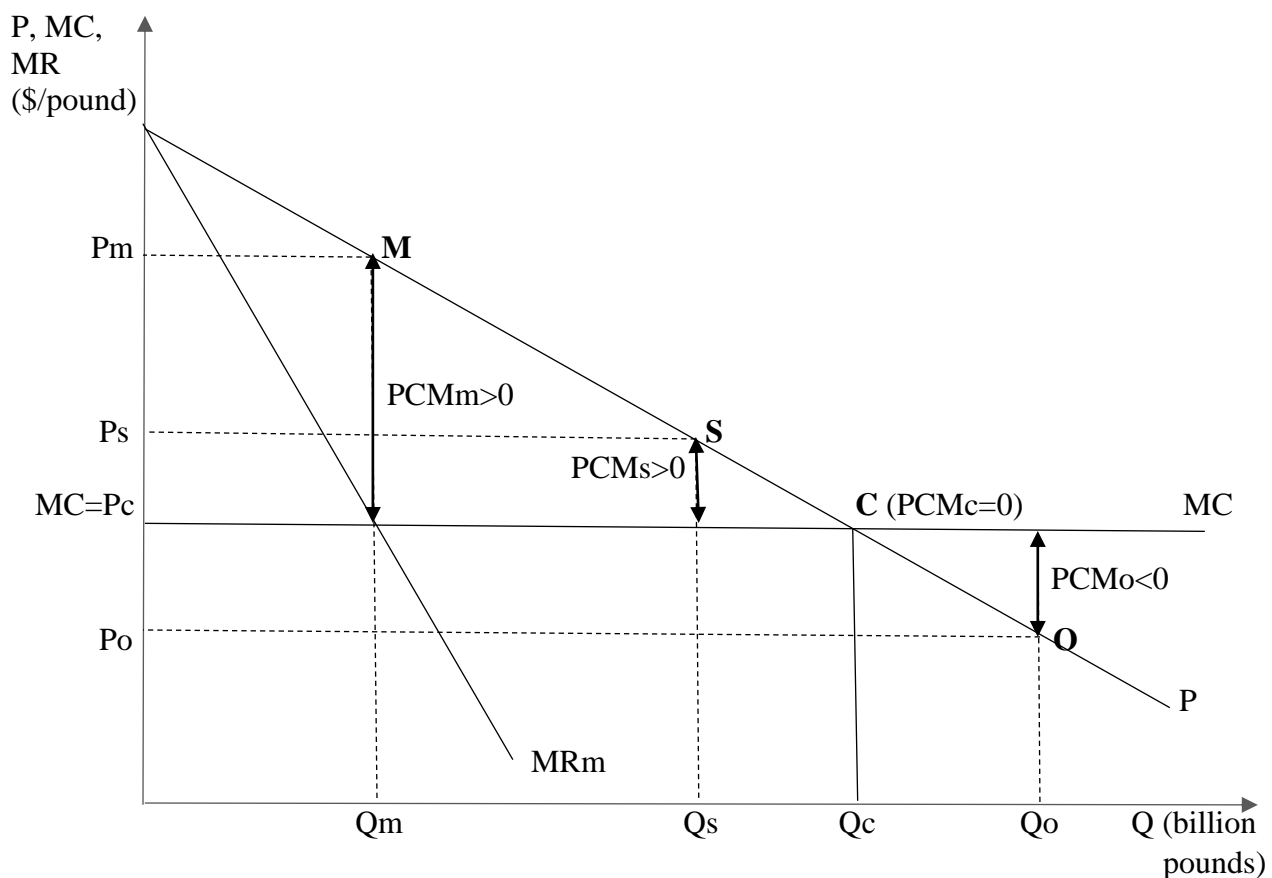


Figure 1. Alternative market scenarios for the U.S. peanut industry

Note 1: Point O at Q_o and P_o is a *peanut oversupply* scenario. Point C at Q_c and P_c is a *perfectly competitive industry* scenario. Point S at Q_s and P_s is a *small degree of seller market power* scenario. Point M at Q_m and P_m is a *hypothetical monopoly* scenario.

Note 2: Q (billion pounds), P (\$ per pound), MC (\$ per pound), and PCM (\$ per pound) are quantity, price, marginal cost, and price-cost margin, respectively. Subscripts “c,” “o,” “s,” and “m” denote a *perfectly competitive industry* scenario, a *peanut oversupply* scenario, a *small degree of seller market power* scenario, and a *hypothetical monopoly* scenario, respectively.

Table 1. Alternative Market Scenarios for the U.S. Peanut Industry

| Scenario | Price and quantity depicted in Figure 1^a | Comparison of scenarios' prices and quantities | Profit |
|---------------------------------------|--|--|---|
| Perfect competition | Scenario C: Q _c and P _c | P _c =MC | PCM _c =P _c −MC=0 Zero profit for the industry and firms |
| Peanut oversupply | Scenario O: Q _o and P _o | Q _o >Q _c P _o <MC | PCM _o =P _o −MC<0 PCM _o <PCM _c Loss for the industry and firms |
| A small degree of seller market power | Scenario S: Q _s and P _s | Q _s <Q _c P _s >MC | PCM _s =P _s −MC>0 PCM _s >PCM _c Profit for the industry and firms |
| Hypothetical monopoly | Scenario M: Q _m and P _m | Q _m <Q _s <Q _c P _m >P _s >MC | PCM _m =P _m −MC>0 PCM _m >PCM _s >PCM _c Profit for the industry and firms |

^a Q (billion pounds), P (\$ per pound), MC (\$ per pound), and PCM (\$ per pound) are quantity, price, marginal cost, and price-cost margin, respectively. Subscripts “c,” “o,” “s,” and “m” denote *a perfectly competitive industry* scenario, *a peanut oversupply* scenario, *a small degree of seller market power* scenario, and *a hypothetical monopoly* scenario, respectively.