

Problem Set 1

Partially from **Producers celebrate first anniversary of marketing freedom**  
(August 13, 2013; Dan Jensen, CamroseBooster.com)

The Canadian Wheat Board was permanently established in 1935 and given the authority in the 1940s to be a single-desk purchaser and marketer of malt barley and wheat from the Great Plains Provinces, both for domestic human consumption and for all exports of malting barley and wheat. In November 2011, the Conservative Party of Canada, whose platform partly focused on market deregulation, succeeded in obtaining legislation to end the CWB's single-desk authorities, which went into effect on August, 2012. This represented a major change in how North American malting barley and wheat markets could function and is likely to have important impacts on market participants and Canadian grain exports.

A Canadian Federation of Independent Business study conducted over the first year of marketing freedom found that the vast majority of agri-businesses (81 per cent) were positively impacted by marketing freedom. More than three-quarters said they had greater control of the decision-making for their products and two-thirds said marketing freedom has delivered better market signals, better access to competitive prices and increased cash flow.

"Marketing freedom has reinvigorated our grain industry as never before," said the Canadian Minister for Finance Kevin Sorenson. "In year one we saw good movement of grains throughout our system. Organic farmers can now sell their crop to the customers with no red tape, with no fees, with no sale or force to the Canadian Wheat Board, and then with no need to buy it back from the Canadian Wheat Board. Malt barley producers here in Alberta are contracting daily with U.S. breweries, something that would not have happened, would have been unthinkable under the monopoly."

Sorenson said marketing freedom couldn't have come at a better time. "World demand for food is growing as never before, as we have seen China and India develop more and more of an appetite for our grains and for our commodities. It has brought real results to our farm businesses in Alberta and I am convinced the best is yet to come."

Steven Snider, from Little Red Hen Mills, noted that he "moved out 160 metric tonnes of barley that got milled for organic dog food going states side. Before with the wheat board we would never have had a chance with that market. It would have been an uphill battle. Now everything is normal. I sell my barley like I sell my oats, like I sell my hay. I phone up a contractor, a broker, and we talk price and there is nobody meddling with us. It is just up to me and them to do a business transaction and move forward."

In problems 1–3, discuss and illustrate using supply and demand diagrams

1. Explain and graph what has occurred in the market for Canadian barley after the Canadian Wheat Board was removed.
  - (a) Has there been a change (shift) in the demand for Canadian grain, a change (shift) in the supply, or both? Or neither? You must illustrate the phenomena and then justify your answers.
  - (b) What does your analysis suggest about the resulting quantities and prices of Canadian barley?
  - (c) What are the possible factors driving these changes? You are not required to provide any graphs for this question, but your answers must be supported by facts (i.e., citations).
2. Given your prediction of what will occur to prices from problem #1, describe the effect on Canadian beer production (assuming that malt barley, an ingredient necessary for beer production, was sourced by Canadian brewers from Canadian farmers).
  - (a) Has there been a change (shift) in the demand for Canadian beer, a change (shift) in the supply of Canadian beer, or both? Or neither? You must illustrate the phenomena and then justify your answers.
  - (b) What does your analysis suggest about the resulting quantities of Canadian beer and its prices?
  - (c) Are Canadian and American beers substitutes or complements? Illustrate the potential impact on the markets for American beer within Canada.
3. Consider the possible implications on barley producers in Montana, who have traditionally contracted with U.S. brewers to supply malt barley.
  - (a) Why would Montana barley farmers even be affected by the Canadian Wheat Board deregulation?
  - (b) Explain and graph what, if anything, may occur in the markets for Montana barley.
  - (c) What does your analysis suggest about the resulting quantities of Montana barley produced and price of the grain?

In problems 3–5, you will need to solve for equilibrium market conditions. Please carefully illustrate every step of your work and circle your final answers. Failure to do so will result in point deductions.

4. Suppose that a number of larger U.S. brewers commissioned you to study the issue described above. Primarily, you want to analyze the U.S. beer market before and after the Canadian Wheat Board deregulation. Your first task is to determine the

equilibrium conditions of the beer market prior to the Canadian policy change. Through preliminary research, you were able to determine that the demand for beers is defined by the function:  $P_D = 720 - 20Q$ . Production of beer requires malt, hops and yeast, and labor. Assume that the supplies of the other three ingredients are upward sloping and are characterized by the functions:

$$P_{malt} = -500 + 6Q$$

$$P_{hops/yeast} = -500 + 1.5Q$$

$$P_{labor} = -50 + 2Q$$

Lastly, breweries incur a fixed cost of \$775 associated with the building and equipment operation for producing the beer. Solve for the following:

- (a) Equilibrium quantity of beer (in millions of gallons).
  - (b) Equilibrium price of beer (in dollars per gallon).
  - (c) Equilibrium price of labor.
  - (d) Equilibrium quantity of labor.
5. Now suppose that two things changed: the demand for beer grew and breweries needed to incur additional transportation costs for getting barley from Canada. The new demand function is characterized as  $P_D = 725 - 20Q$  and the transportation supply function is  $Q_{trans}^S = -80 + 4P$ . We will assume that no other factors have changed from problem #4, so refer to the above problem for the remaining pieces of information. Solve for the following:
- (a) Equilibrium quantity of beer (in millions of gallons).
  - (b) Equilibrium price of beer (in dollars per gallon).
6. Suppose that the Canadian brewers lobby convinces the Canadian government to tax U.S. brewers who purchase barley from Canadian farmers. Let's assume that this would only affect a brewer's fixed costs (a flat tax) and that this would increase a brewer's total fixed costs by \$150. Solve for the following.
- (a) Equilibrium quantity of beer (in millions of gallons).
  - (b) Equilibrium price of beer (in dollars per gallon).
  - (c) There are 128 ounces in a gallon of beer. Assuming that a beer is sold in 16 ounce units, what would a brewery charge per served unit?
  - (d) Discuss the implication of your answer in (c) on a U.S. breweries' potential for selling beer. What might this imply for continued contracting between U.S. brewers and Canadian barley farmers?

Montana is well known for its feeder cattle production, although there are a few small feedlots located around the state. A notable exception is a large feedlot operation in central Montana, which has a capacity of 15,000 head of cattle. While this feedlot has been a relative mainstay in that area, it had undergone changes in ownership leading to several years when the feedlot was not as productive. Recently, however, the feedlot has grown substantially.

Typically, when we think of feedlots, we almost immediately think of corn. However, Montana's dry climate and relatively short growing season is not suitable for any substantial corn production. As a result, barley is used as the primary crop for livestock feed. The resurgence of the central Montana feedlot may have altered the feeder cattle and barley markets in the region, leading to important and interesting economic implications. You are tasked with developing key insights into the changes associated with the large feedlot.

7. Your first goal is to understand the initial equilibrium market conditions for the regional fed cattle market. You know that the demand for central Montana fed cattle is described by the function:  $Q_D = 300 - 0.25P$ . The production of fed cattle requires that the feedlot buys feeder cattle, barley for feed, has regular veterinary care, and maintains storage bins that contain a sufficient supply of feed. The supplies of these inputs are characterized by upward sloping functions:

$$Q_{feeders} = 10 + 0.02P$$

$$Q_{barley} = 0.1P$$

$$P_{vet} = 100 + 4Q$$

The costs of maintaining storage facilities is relatively constant and is approximately \$600 per year. Please solve for the following:

- (a) Equilibrium quantity of fed cattle (in thousands of head).
  - (b) Equilibrium price of fed cattle (in dollars per head).
  - (c) Equilibrium price of veterinary care (in dollars per hour).
  - (d) Equilibrium quantity of veterinary care (in number of visits per year).
8. Suppose that the growth of the revived feedlot began in 2010. In 2013, this growth has likely impacted the regions barley markets.
    - (a) Illustrate using a supply and demand diagram the effect of the feedlot's growth on barley markets.
    - (b) Summarize the impacts on the price and quantities of barley as that market transitioned between 2010 to 2013.
    - (c) In 2-3 sentences, please discuss the dynamics of the transition in the barley markets. Did the changes you show in (a) occur instantaneously? If not, what is your hypothesis of how the markets adjusted between 2010 and 2013?

9. Now, examine the central Montana fed cattle market equilibrium in 2013, after changes in the barley market. Suppose that the supply function for barley is now  $Q_{\text{barley}} = 0.07P$ . The fed cattle demand, feeder cattle supply, and veterinary services supply remain the same as they did in #1. However, changes in the barley market have also impacted the fixed costs, causing them to increase to \$650.

Please solve for the following:

- (a) Equilibrium quantity of fed cattle (in thousands of head).
  - (b) Equilibrium price of fed cattle (in dollars per head).
  - (c) Equilibrium price of veterinary care (in dollars per hour).
  - (d) Equilibrium quantity of veterinary care (in number of visits per year).
10. Lastly, you are interested in understanding the impacts on nearby wheat markets. Prior to the expansion of the feedlot, central Montana's barley was sourced from areas near central Montana and satisfied residual demands by acquiring barley from nearby regions, such as that around Great Falls.
- (a) As barley markets transition to a new equilibrium in central Montana, what do you expect to happen to barley demand in Great Falls? Ensure that your explanation uses economic logic and terminology.
  - (b) Illustrate the impacts on the Great Falls wheat markets as a result of what you discussed in (a).
  - (c) Summarize the impacts on the price and quantities of Great Falls wheat as the central Montana barley market transitioned between 2010 to 2013.