WRITTEN PRELIMINARY Ph.D. EXAMINATION

Department of Applied Economics

University of Minnesota

June 13, 2011

MANAGERIAL, FINANCIAL, MARKETING
AND PRODUCTION ECONOMICS FIELD

Instructions:

- Write your code letter, not your name, and the page sequence on all sheets of paper and be sure to turn in these sheets at the end of the exam.

- Start each new question at the top of a new page. Please write legibly and on only one side of each page.

- This is a closed book exam. No notes, articles, books, or other sources may be used at the exam. You may not access the Internet for any reason while taking this exam. Accessing notes, articles, the internet, or other materials during the exam will result in a failing grade on the exam.

- The exam has three sections, and you are expected to answer four questions.

  Answer at least one question from each section

  When finished you should have answered four questions, with at least one question from each section and two questions from at most one section.

- You have four hours to complete this examination.
Section I – Managerial Economics

Question 1

Think about the following issues in production agriculture.

Assembles farm inputs:

<table>
<thead>
<tr>
<th>What inputs?</th>
<th>How?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land, equipment, feed, energy, water, chemicals, seed stock, genetics, labor, management</td>
<td>Owns, rents, or produces assets; buys materials (directly or through a cooperative), produces them on a farm or acquires them through a contract; provides or hires labor and management services</td>
</tr>
</tbody>
</table>

Applies inputs to stages of farm production:

<table>
<thead>
<tr>
<th>What stages?</th>
<th>How?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site preparation, planting</td>
<td>Operator applies directly, purchases through custom service, or obtains contract</td>
</tr>
<tr>
<td>Breeding, harvest, removal</td>
<td></td>
</tr>
<tr>
<td>Pest and nutrient management</td>
<td></td>
</tr>
<tr>
<td>Local storage and transportation</td>
<td></td>
</tr>
</tbody>
</table>

Delivers farm products to downstream users:

<table>
<thead>
<tr>
<th>What users?</th>
<th>How?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other farms, consumers</td>
<td>Sells through spot or futures markets, transfers through contract, or transfers between commonly-owned units through vertical integration</td>
</tr>
<tr>
<td>Intermediaries</td>
<td></td>
</tr>
<tr>
<td>Processors, retailers,</td>
<td></td>
</tr>
</tbody>
</table>

Choose a food crop that can be produced as some form of a differentiated product. Outline the necessary things that would be part of a contract for the differentiated product. Do this for the relationship between a producer and a processor.

a) Describe what issues from *transaction costs theory* apply to this contract for the processor and producer.

b) Describe what issues from *property rights theory* apply to this contract for the processor and producer.

c) Describe what issues from *agency theory* apply to this contract for the processor and producer.
Question 2

One measure of a nation’s economic competitiveness is rooted in economic geography and, particularly, clusters of interconnected firms, suppliers, related industries, and specialized institutions. One well known example of a cluster in agriculture is the wine industry in California. The success of an agricultural cluster is often dictated by the property rights associated with that cluster. For example, various wines in California have a property right associated with the appellation (geographical boundaries) of where certain grapes are grown that produce certain wines. The World Trade Organization (WTO) is currently settling the issue of what constitutes an international trademark in agriculture.

a) Consider an appellation called, “Wisconsin” that labels agricultural products as made in the state of Wisconsin. Discuss the property right associated with that trademark (for example, “Cheese made in Wisconsin”) and discuss the overall advantages and disadvantages of that trademark in creating a differentiated product.

b) Consider Champagne, a sparkling white wine that is labeled as being produced in the province of Champagne in France. The WTO has ruled that no other geographic region in the world can use this labeling. Thus, similar wines outside of Champagne must be labeled as Sparkling White Wine (for example, “California Sparkling White Wine”). Discuss the property right associated with the Champagne trademark and discuss the overall advantages and disadvantages of that trademark in creating a differentiated product.

c) Consider guacamole that is labeled as a Mexican food in many retail supermarkets. Guacamole is made with avocados. A recent court ruled that guacamole made by a well-known U.S. dry packaged goods company that contained little avocado in it could not be labeled guacamole and considered a Mexican food because it was not made like traditional Mexican guacamole. Discuss the property right associated with that trademark (“Guacamole made the traditional way in Mexico”) and discuss the overall advantages and disadvantages of that trademark in creating a differentiated product.
Section II – Financial Economics

Question 1

Popular financial advice for investors concerning portfolio asset allocation decisions encourages risk-averse investors to hold a higher ratio of bonds to stocks. Similarly, investors at different ages are advised to hold different proportions of cash, bonds and stocks (e.g., as the investor ages, the proportion of bonds should increase). These kinds of advice appear to systematically contradict the mutual fund separation theorem as a basic tenet of asset pricing models and it has been identified as an asset allocation puzzle.

a) Carefully state and explain the mutual fund separation theorem, identifying the key underlying assumptions and what the theorem suggests that investors should do.

b) Based on a review of the assumptions underlying the mutual fund separation theorem, what are the alternative economic reasons that might be cited for the asset allocation puzzle? Identify which, if any, of these reasons are plausible explanations for the puzzle.

c) One argument is that investors do not optimize perfectly (i.e., they are “near rational” in their behavior). What might that mean in the context of portfolio theory? How would you determine empirically if near rationality might provide an explanation for the observed discrepancy between the prediction of the mutual fund separation theorem and popular advice concerning asset allocation?
Question 2

In the simplest financial models we assume that decision makers can specify, agree on, and verify states of the world in which they operate, and that they know each other’s preferences. With regard to the use of standard debt contracts this becomes problematic when the characteristics of loan applicants are unobservable. For example the possibility of default together with adverse selection for loan applicants with differing riskiness (of investment projects with uncertain returns) may cause a lender to ration credit among seemingly identical customers.

a) How might an economist define credit rationing? Identify and discuss the apparent conflict of interest between borrowers and lenders with regard to choice of contract that is the basis for credit rationing. How might lenders design financial contracts to address this potential problem?

b) Now consider a situation where there are multiple firms and a lender cannot distinguish between the two types of firms (i.e., the lender is equally likely to face a firm with project 1 or one with project 2). For example, what if there are 10 firms with project 1 and 10 firms with project 2 and each project requires the same amount of funds to invest. The projects are distinguished by the following return distributions:

<table>
<thead>
<tr>
<th>Probabilities</th>
<th>0.5 (low state)</th>
<th>0.5 (high state)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project 1</td>
<td>$100</td>
<td>$180</td>
</tr>
<tr>
<td>Project 2</td>
<td>$60</td>
<td>$220</td>
</tr>
</tbody>
</table>

The lender offers funds at a return of R if firms provide collateral, C. How might one write the general equation for, and diagram, the expected return of the lender? How might one determine the aggregate demand function for loans if firms demand loans for only positive expected profits?

Now, suppose the lender behaves as a price-taker and offers loan funds at their marginal cost. How would you determine the loan market equilibrium and if credit rationing occurs in this case? How might this equilibrium be illustrated? Is this a separating equilibrium?

c) Empirical research on the effects of credit market imperfections can take alternative methodological approaches. One model approach assumes that credit rationing leads to important interactions between production and consumption activities of the firm-household unit. Discuss the underlying microeconomic model briefly and then the econometric approach to estimation. What limitations can you identify concerning use of an econometric approach to the problem, and how might these issues be addressed?
Section III – Production Economics

Question 1

Assume the direction \( g = (1,1) \) and consider the following quadratic, directional input distance function:

\[
\overline{D}_I(x_1, x_2, y : 1,1) = \alpha_0 + \alpha_1 y + 0.5\alpha_{11} y^2 + \beta_1 x_1 + \beta_2 x_2 + 0.5\beta_{11} x_1^2 \\
+ 0.5\beta_{22} x_2^2 + 0.5\beta_{12} x_1 x_2 + 0.5\beta_{21} x_2 x_1 + \gamma_1 y x_1 + \gamma_2 y x_1.
\]

Here, \( y \) represents an output level, and \( x_1 \) and \( x_2 \) represent the levels of inputs 1 and 2, while \( \alpha_0, \alpha_1, \alpha_{11}, \beta_1, \beta_2, \beta_{11}, \beta_{12}, \beta_{21}, \gamma_1 \) and \( \gamma_2 \) are production coefficients.

a) Assuming symmetry in the relevant input coefficients, define translation for the directional input distance function. For equation (1), derive the sufficient conditions for translation to hold.

b) Is equation (1) linearly homogeneous in inputs? Justify your answer.

c) Let \( w_1 \) and \( w_2 \) represent the price of inputs 1 and 2, respectively, and consider the following cost minimization problem

\[
c(w_1, w_2, y) \equiv \max_{x_1, x_2} \left\{ w_1 x_1 + w_2 x_2 : \overline{D}_I(x_1, x_2, y : 1,1) \geq 0 \right\}
\]

where \( \overline{D}_I(\cdot) \) is given by equation (1).

i) Derive the first-order necessary conditions for the optimal choice of \( x_1 \) and \( x_2 \). Do not try to solve for the optimal levels of these variables. Give your interpretation of these first order conditions.

ii) Assume you had data on input prices, and on output and input levels. If you estimated \( \overline{D}_I(\cdot) \), what sign would you want to see on \( \alpha_1, \alpha_{11}, \beta_1, \beta_2, \beta_{11} \) and \( \beta_{22} \)? Explain your answer.

d) Assume now, that input 2 is a fixed factor and that no market exists for buying and selling this factor. Given data on \( w_1, x_2 \) and \( y \), and given the cost function

\[
c(w_1, x_2, y) \equiv \max_{x_1} \left\{ w_1 x_1 : \overline{D}_I(x_1, x_2, y : 1,1) \geq 0 \right\}
\]

explain how to estimate/recover the shadow value of \( x_2 \).
Question 2

A group of \( K \) firms use a vector of \( N \) inputs to produce two outputs. Denote the vector of input levels used by firm \( k \) by \( \mathbf{x}_k \in \mathbb{R}^N \), and the corresponding vector of output levels by \( \mathbf{y}_k \in \mathbb{R}^2_+ \). Assume these firms face the piecewise linear technology

\[
T = \left\{ (\mathbf{x}, \mathbf{y}) : \sum_k z_k \mathbf{y}_k \geq \mathbf{y}; \sum_k z_k \mathbf{x}_k \leq \mathbf{x}; \sum_k z_k = 1 \right\}
\]

Figure 1 (next page) presents a graph with output levels of seven firms, with each firm indexed by one of the output combinations \( A \) through \( G \). The vector \( g \) represents a directional output vector.

a) Assuming free disposability of outputs, use the graph provided in figure 1 (on the attached page) to draw the boundary of the technology set \( T \).

b) Let \( p_1 \) and \( p_2 \) represent the market price of outputs 1 and 2 respectively. Assume the output price ratio is such that revenues are maximized by output combination \( D \). Draw a representation of the corresponding price ratio in figure 1.

c) Which firms are technically efficient? Explain your answer.

d) Consider the output combinations of firms \( C \) and \( G \).

i) Using figure 1 and the directional vector \( g \), explain (and show in the graph) how much revenue firm \( C \) loses because of technical inefficiencies and how much revenue the firm loses because of allocative inefficiencies.

ii) Using figure 2 and the directional vector \( g \), explain (and show) how much revenue firm \( G \) loses because of technical inefficiencies and how much revenue the firm loses because of allocative inefficiencies.
Figure 1
Figure 2