Question.

Please answer all 3 questions. Notice the time allotted to each.

January 14, 2013

PART I

Ph.D. Qualifying Exam January 2013

Economics

Department of Economics and of Agricultural and Applied
Problem 1 (80 minutes)

Suppose that $N \in \mathbb{N}$ consumers enter the economy $E$. Each consumer has the same utility function and the same endowment as consumer 1. What is the distribution of wealth levels $u_1^N$ and $w_1^N$ and transfers $t_1$ and $t_2$.

(a) What of the Pareto-optimal allocations can be supported by a price vector $p$?

(b) Suppose that $N \in \mathbb{N}$ consumers enter the economy $E$. Each consumer has the same utility function and the same endowment as consumer 1. What is the distribution of wealth levels $u_1^N$ and $w_1^N$ and transfers $t_1$ and $t_2$.

(c) Draw the Edgeworth box for the economy $E$ and determine the set of Pareto-optimal allocations.

(d) Draw the Edgeworth box for the economy $E$ and determine the set of Pareto-optimal allocations.

(e) Show that consumer 1's preferences are not continuous.

(f) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(g) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(h) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(i) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(j) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(k) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(l) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(m) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(n) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(o) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(p) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(q) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(r) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(s) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(t) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(u) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(v) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(w) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(x) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(y) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.

(z) Let $d \in \mathbb{R}$, $x \in \mathbb{R}$, and $y \in \mathbb{R}$.
Hints: A diagram might help you analyze the problem. But you still need to do the algebra. For your information, \( \sqrt{\frac{10}{3}} = 2.4 \). If needed.

(c) What is the maximum profit at the profit-maximizing location?

(q) What location is MLI going to choose?

For all \( q > 0 \),

\[ f(q) = 28 - \frac{8q}{16} + 32q < 0 \]

Derive the marginal cost function for MLI and show that MLI's \( MC(q) < 0 \).

\[ f(q) = 28 - \frac{8q}{16} + 32q > 3.5 \]

would face a linear demand curve given by the inverse demand function.

either enter or operate in the perfectly competitive \( \Omega \)-market where the prevailing market price is \( p = 25 \).

\[ C(q) = \frac{3}{16}q - 16q + 32q. \]

Mary Lynn Industries (MLI) has a cost function.

Problem 2 (60 minutes)
Problem 3 (60 minutes)

The monopolist faces demand from two groups, group 1 and group 2. The respective demand functions are 

\[ P_1 = 10000 - Q_1 \]
\[ P_2 = 10000 - 2Q_2 \]

The monopolist's marginal cost is constant and equal to 25. The marginal cost function is:

\[ MC = 25 \]

The monopolist's goal is to maximize profits. To achieve this, the monopolist needs to:

1. Draw the marginal revenue (MR) and marginal cost (MC) curves.
2. Determine the marginal revenue function resulting from the demand functions.
3. Determine the aggregate inverse demand function.
4. Determine the aggregate demand curve.
5. Determine the profit-maximizing quantity and price for group 1 and group 2.
6. Solve for the prices and quantities for each group.
7. Calculate the total profits.

The objective is to find the optimal price and quantity for each group to maximize profits. This involves setting MR equal to MC and solving for the optimal point on the aggregate demand curve.
Question:
Answer all questions, taking note of the recommended time allocation for each.

January 17, 2013

Part 2

January 2013

Ph.D. Qualifying Exam

Departments of Economics and Department of Agricultural and Applied Economics
Problem 1 (30 minutes)
How would your answers differ if the $X$ were serially independent?

What does the martingale difference sequence assumption imply about the possibility of forecasting $X_t$ from a linear function of past values of $X$?
null and alternative hypothesis. Please state clearly how you get each component of the test.

Please state the null hypothesis, test statistics, the statistic distribution under the null hypothesis of the model across individual N (i.e., how would you determine if the model includes the intercept and all the X variables). Please describe how you would test the model into a compact form: $\mathbf{y} = \mathbf{X} \beta + \mathbf{Z} \gamma + \epsilon$, where $\mathbf{Z}$ is of dimension $ NT \times (K+1)$, which

Consider a standard longitudinal data set again. Let us write the above panel data

smaller Why?

correlation would you expect the efficiency gain of RE compared to FE to be larger or

Within FE, between estimator, and RE GLS.

Within FE, between estimator, make use of the between-group variation: OLS.

Problems

(a) Assume that the true model satisfies the following conditions: $\mathbf{y} \sim N(0, \Sigma)$, of: $\alpha_i + \beta \mathbf{x}^i \sim N(0, \sigma^2)$, where $\alpha_i$ is a scalar and $\mathbf{x}^i$ is of dimension $K \times 1$. The error term has the structure

$\vdots$

Consider the following regression model

Problem 2 (30 minutes)
Problem 3 (30 minutes)
You can assume that \( \phi + \phi^T = 1 \). 

Now consider the second stage of this "two-stage least squares" estimator introduced in part (c) above, where \( \lambda \) is the second stage residual and the fitted value of \( \lambda \) is represented as a scaled version of \( \hat{\beta} \).

Let the residuals from the first-stage regression be \( \phi \) and \( \phi^T \).

Express the fitted value of \( \phi \) in terms of \( \phi \).

Denote \( \phi + \phi^T = 1 \).

Now consider a "two-stage" first-stage regression that only uses the actual instruments on the right-hand side. You can write \( \phi \) as.

Thus, the second-stage model can be written as \( \lambda \) as above.
You do not need to solve the model again, but you need to briefly explain your answer:

\[ c_t = c_t + \beta c_{t+1} + \beta^2 c_{t+2} + \beta^3 c_{t+3} + \ldots \]

Explain why the policy function will have the form:

\[ \nu_t \sim \Gamma(\nu, \lambda, \xi) \]

(a) Write down the Buchanan equation for consumption. Does consumption follow a random walk?

\[ I > d > 1 - \nu \sim \Gamma(0.0, 0.0) \]

(b) You are told that the policy function for consumption has the form:

\[ \phi = \phi \beta^2 c + \beta^3 c_{t+1} + \beta^4 c_{t+2} + \ldots \]

(c) Explain why \( \nu \), the measure of income uncertainty, does not affect consumption.

(d) What is the unconditional variance of \( c_t = \beta \nu_t \) the change in consumption? How does an increase in \( \nu \) affect the unconditional variance? Is the variance the same as \( \sigma^2 \nu \)?

(e) Suppose the productivity shock follows a second-order process:

\[ \nu_t = \nu_{t-1} + \nu_{t-2} + \epsilon_t \]

(f) You are told that the productivity shock follows an autoregressive model:

\[ \epsilon_t = \rho \epsilon_{t-1} + \eta_t \]

(g) The term \( I \) is the marginal product of capital. Capital accumulation through saving, and there is a depreciation:

\[ I = \beta K + \beta^2 K + \beta^3 K + \ldots \]

(h) By capital \( K \), subject to a productivity shock \( \epsilon_t \):

\[ K = \frac{1}{\beta} \]

(i) We assume that is small enough that marginal utility is always positive. Output \( Y \) is produced:

\[ Y = \sum_{t=0}^{\infty} e^t Y \]

We consider a discrete-time representative agent model with a constant population. The lifetime expected utility of a household at time zero is written as:

\[ U = \sum_{t=0}^{\infty} \frac{1}{\beta} e^t (c_t - c_{t-1}) \]

Question 4: A representative agent model with quadratic utility (45 minutes)
The time 1 parent selects $c_t^1$ (and hence $c_t^2$) to solve:

Government spending yields benefits to neither generation.

$$c_t^2 + c_t^2 = 0$$

This budget constraint is

$$c_t^2 + d_t^2 - y_t^2 = 0$$

The savings of the time 1 generation is $s_t^1 = c_t^2 + d_t^2 - y_t^2$. The government has a fixed amount of spending at time 1. It can finance this spending net of revenue (and hence lump-sum taxes).

In these equations, $s_t^1$ is the saving of the time 1 parent (which is constrained to be non-negative). $d_t^2$ is the saving of the time 2 parent. $c_t^2$ is the time 2 consumption of this offspring.

The budget constraints are:

$$c_t^2 + d_t^2 - y_t^2 = 0$$

in which $c_t^1$ is this own consumption and $c_t^2$ is the time 2 consumption of this offspring.

A time 1 parent wishes to maximize

$$\max (c_t^1 + \ln(c_t^2))$$

of $c_t^2$.

A time 1 parent will pay $I_t^1$ until output at time 2. If the real interest rate is fixed at $r_0$.

Consider a two-period, two-generation economy. Each member of the time 1 generation has an endowment of $y_t$ and consumes and saves from this endowment. This generation has an endowment of $y_t$ and consumes and saves from this endowment. Each member of the time 1 generation consumes $c_t^1$. Each member of the time 2 generation consumes $c_t^2$.
Explain the marginal change in $e^0$.

(b) Suppose the optimal $e^0 > 0$. What are the effects on optimum $c^1$ and $c^2$ of a

optimal value for $e^0$. What is saving in this case? What is the

optimal value for $e^0$ in this case? When is the

time I generation selects a positive $e^0$. When is the

$e^0 < 0$, $e^0 > 0$, $e^0 = 0$, $e^0 < 0$. and

The time I generation selects 1 and 0 to

$e^0 = \beta$

Generation 2: $c^1 = 0$, $e^0 > 0$, $s^1 > 0$, $e^0 < 0$.

Generation 1: $c^1 = 0$, $e^0 > 0$, $s^1 > 0$, $e^0 < 0$.

The new budget constraints:

(c)

Your results. If $r_i$ for the Ricardoian Equivalence Theorem?

Which are the implications of

is a marginal decrease in $e^0$. What happens to $c^1$ and $s^1$? When are $s^1$ and $c^1$ in this case? Suppose there is a marginal decrease in $e^0$. What happens to $c^1$ and $s^1$? When are $s^1$ and $c^1$ in this case? Suppose there

Economic intuition underpinning your answers.

(a) Solve the individual's optimization problem. Determine optimal consumption in each case and explain the

saving is $s^0 = 0$, or $s^1 > 0$. Determine optimal consumption in each case and explain the

saving is $s^0 = 0$, or $s^1 > 0$. Determine optimal consumption in each case and explain the