Qualification Test for Ph.D. Program in Business
Research Methods

4/24/2020

For 1st semester:

1. An economics department at a large state university keeps track of its majors' starting salaries. Does taking econometrics affect starting salary? Let *SAL* = salary in dollar, *GPA* = grade point average on a 4.0 scale, *METRICS* = 1 if student took econometrics, and *METRICS* = 0 otherwise. Using the data containing information on 50 recent graduates, we obtain the estimated regression

   $\widehat{SAL} = 24200 + 1643GPA + 5033METRICS \quad R^2 = 0.74$

   (se) (1078) (352) (456)

   (a) Interpret the estimated equation. (5%)
   (b) How would you modify the equation to see whether women had lower starting salaries than men? (10%)
   (c) How would you modify the equation to see if the value of econometrics was the same for men and women? (10%)

2. Please describe the method of testing the equivalence of two regression equations. (Hint: Chow test) (15%)

3. (a) Explain what is meant by (i) an omitted variable and (ii) an irrelevant variable. (10%)
   (b) Explain the consequences of omitted and irrelevant variables for the properties of the least squares estimator. (10%)

4. Consider the following estimated regression equation (standard errors in parentheses):

   $\hat{y} = 5.83 + 0.869x \quad R^2 = 0.756$
   (se) (1.23) (0.117)

   Rewrite the estimated equation that would result if
   (a) All values of x were divided by 20 before estimation (10%)
   (b) All values of y were divided by 50 before estimation (10%)

5. In multiple regression analysis, what are the relationships between ***t***- and ***F***-tests? (10%)

6. Suppose from a sample of **51** observations, the least squares estimates and the corresponding estimated covariance matrix are given by

$$\begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \\ -1 \end{bmatrix}, \quad \widehat{\text{cov}(\text{b})} = \begin{bmatrix} 3 & -2 & 1 \\ -2 & 4 & 0 \\ 1 & 0 & 3 \end{bmatrix}$$

Test each of the following hypotheses and state the conclusion:

(a) $\beta_1 + 3\beta_2 = 5$ (5%)

(b) $\beta_1 - \beta_2 + 2\beta_3 = 4$ (5%)

Qualification Test for Ph.D. Program in Business
Research Methods

10/4/2023

For 1st semester:

1. In multiple regression analysis, what are the relationships between ***t***- and ***F***-tests? (15%)

2. (a) Explain what is meant by (i) an omitted variable and (ii) an irrelevant variable. (5%)
   (b) Explain the consequences of omitted and irrelevant variables for the properties of the least squares estimator. (10%)

3. When using N = 50 observations to estimate the model $Y_i = \beta_1 + \beta_2 X_i + \beta_3 Z_i + e_i$, you obtain SSE = 2132.65 and $s_y = 9.8355$.

   (a) Find R^2. (5%)
   (b) Find the value of the F-statistic for testing $H_0 : \beta_2 = 0, \beta_3 = 0$. Do you reject or fail to reject H_0 at a 5% level of significance? (5%)

4. Please describe the method of testing the equivalence of two regression equations. (Hint: Chow test) (10%)

Qualification Test for Ph.D. Program in Business
Research Methods

10/4/2023

For 2nd semester:

1. Consider a model for the health of an individual:

$$health = \beta_0 + \beta_1 age + \beta_2 weight + \beta_3 height + \beta_4 male + \beta_5 work + \beta_6 exercise + u$$

where *health* is some quantitative measure of the person's health, *age, weight, height*, and *male* are self-explanatory, *work* is weekly hours worked, and *exercise* is the hours of exercise per week.

(a) Why might you be concerned about *exercise* being correlated with the error term u? (5%)

(b) Suppose you can collect data on two additional variables, *disthome* and *distwork*, the distances from home and from work to the nearest health club or gym. Discuss whether these are likely to be uncorrelated with u. (5%)

2. Please describe a test for the existence of correlation between the error term and the explanatory variables in a model, explaining the null and alternative hypotheses, and the consequences of rejecting the null hypothesis. (15%)

3. Please explain (a) why lags are important in models that use time-series data, and (b) the ways in which lags can be included in dynamic econometric models. (15%)

4. Please describe the two-stage least squares estimation procedure for estimating an equation in a simultaneous equations model, and explain how it resolves the estimation problem for least squares. (10%)

Qualification Test for Ph.D. Program in Business
Research Methods

10/2-3/2024

For 1st semester:

1. A large company is accused of gender discrimination in wages. The following model has been estimated from the company's human resource information

   $$ln(WAGE) = 1.439 + .0834\ EDU + .0512\ EXPER + .1932\ MALE$$

   where ***WAGE*** is hourly wage, ***EDU*** is years of education, ***EXPER*** is years of relevant experience, and ***MALE*** indicates the employee is male.

   (a) What is the marginal effect of experience on wages? (10%)
   (b) How much more do men at the firm earn, on average? (5%)

2. What is the dilemma of choosing between generalized least squares (GLS) and ordinary least squares (OLS) with robust standard errors when heteroskedasticity is present? Under what circumstances would you choose to use robust standard errors? (15%)

3. When using N = 50 observations to estimate the model $Y_i = \beta_1 + \beta_2 X_i + \beta_3 Z_i + e_i$, you obtain SSE = 2132.65 and $s_y = 9.8355$.

   (a) Find R^2. (5%)
   (b) Find the value of the F-statistic for testing $H_0: \beta_2 = 0, \beta_3 = 0$. Do you reject or fail to reject H_0 at a 5% level of significance? (5%)

4. Please describe the method of testing the equivalence of two regression equations. (Hint: Chow test) (10%)

Qualification Test for Ph.D. Program in Business
Research Methods

10/2-3/2024

For 2nd semester:

1. The labor supply of married women has been a subject of a great deal of economic research. Consider the following supply equation specification

$$HOURS = \beta_1 + \beta_2 WAGE + \beta_3 EDUC + \beta_4 AGE + \beta_5 KIDSL6 + \beta_6 NWIFEINC + e$$

where ***HOURS*** is the supply of labor, ***WAGE*** is hourly wage, ***EDUC*** is years of education, ***KIDSL6*** is the number of children in the household who are less than 6 years old, and ***NWIFEINC*** is household income from sources other than the wife's employment.

(a) Discuss the signs you expect for each of the coefficients. (5%)

(b) Explain why this supply equation cannot be consistently estimated by OLS regression. (5%)

2. Please describe a test for the existence of correlation between the error term and the explanatory variables in a model, explaining the null and alternative hypotheses, and the consequences of rejecting the null hypothesis. (15%)

3. Please explain (a) why lags are important in models that use time-series data, and (b) the ways in which lags can be included in dynamic econometric models. (15%)

4. Please describe the two-stage least squares estimation procedure for estimating an equation in a simultaneous equations model, and explain how it resolves the estimation problem for least squares. (10%)

Dear all,

*As part of your qualification exam, you will be asked to critically analyze how information systems can be used to address real-world business challenges. This is an **open book** exam, designed to assess your ability to synthesize theory, practice, and research in the field of information systems.*

What You Should Prepare:

1. **Understand Key Concepts:**
    - Review major types of information systems: ERP, CRM, **SCM, DSS, BI**, AI/ML-based systems, etc.
    - Understand system architecture, data flow, integration, and implementation strategies.
2. **Explore Real-World Business Problems:**
    - Identify and study cases involving issues like supply chain disruptions, customer retention, fraud, operational inefficiencies, or strategic decision-making.
    - Think about how organizations have used technology to solve these problems.
3. **Research and Literature Review:**
    - Gather academic papers, case studies, and industry reports that demonstrate successful (or failed) implementations of information systems.
    - Be ready to cite relevant frameworks, models, and methodologies.
4. **Critical Thinking and Analysis:**
    - Practice evaluating the **fit** between a business problem and a technological solution.
    - Consider organizational, ethical, and strategic implications of system adoption.
5. **Prepare to Write a Structured Response:**
    - Your answer should include:
        - Problem definition
        - System selection and justification
        - Design and implementation considerations
        - Evaluation of outcomes and risks
        - Strategic and ethical reflections

Tips for Success:

- Use diagrams or models where appropriate to illustrate system architecture or workflows.
- Be analytical, not just descriptive—show your ability to critique and improve solutions.
- Draw connections between theory and practice.
- Stay focused on the business value and strategic impact of the information system.

Question:

"Organizations today face complex and dynamic business challenges that require strategic use of information systems. Choose a real-world business problem—either from industry or from your current research focus—(e.g., supply chain inefficiency, customer churn, fraud detection, market forecasting, etc.) and critically analyze how an information system can be designed or leveraged to address this issue. Your response should include:

1. A clear description of the business problem and its impact.

2. An explanation of the type(s) of information **systems** that **could be used** (e.g., ERP, CRM, DSS, BI, AI-based systems).

3. A discussion of the system architecture, data requirements, and integration challenges.

4. An **evaluation** of the expected outcomes, benefits, and potential risks.

5. A reflection on ethical, organizational, and strategic **considerations** in implementing the solution."

Instructions:

• You may use academic **literature**, **case studies,** and industry reports to support your analysis.

• Your answer should demonstrate **depth** of understanding, critical thinking, and the **ability** to synthesize interdisciplinary knowledge.

Dear students,

Here are information regarding your Qualification Exam。

Subject: Quantitative Methods (I)
Date: 11th March, 2026 (Wednesday)
Time: 9AM-4PM
Location: Room M419

＃You can't leave the room until you submit your exam paper except going to the bathroom (5 min). Lunch will be available in the room for free.

Regulations of this Subject	
1. Book or Reference in the exam.	NOT Allowed
2. To use Dictionary in the exam	NOT Allowed
3. To use Calculator in the exam	Basic Calculator Only
4. Reading Lists prior the exam	NOT Available

*Julia will provide the basic calculator.

Subject: Seminar on Information Management
Date: 12th March, 2026 (Thursday)
Time: 9AM-4PM
Location: Room M419

＃You can't leave the room until you submit your exam paper except going to the bathroom (5 min). Lunch will be available in the room for free.

Regulations of this Subject	
1. Book or Reference in the exam.	Printed Book or Reference only
2. To use Dictionary in the exam	Printed Dictionary Only
3. To use Calculator in the exam	Basic Calculator Only
4. Reading Lists prior the exam	Not Available

*Julia will provide the basic calculator.

商博-資格考重要事項

1. 考試科目:資訊管理研討
2. 日期:2026.3.12(星期四)
3. 時間:上午 9 點-下午 4 點 (中午不休息)
4. 地點:管理 419
5. 中午學程會提供免費便當，直接送進考試教室。
6. 電子設備及電子穿戴裝置(包含行動電話、手錶、手環、智慧型眼鏡、筆電、PDA、任何有拍照或網路傳輸功能的裝置... 等)，必須關閉電源並放置於包包內，測驗開始後至監考人員宣布離開試場前皆不得發出任何聲響(包含震動)，也不能將其從包包拿出。
7. 如果中途要離開教室，要填寫離開與返回教室的時間，而且不可以攜帶任何電子設備與電子穿戴裝置出去。
8. 資訊管理研討特別注意:

考試相關規定:	
1. 是否可以帶參考書進入考場(Open Book)	■可以
2. 是否可以帶字典(非電子字典)進入考場	■可以
3. 是否可以使用計算機(學程提供)	■可以
4. 是否有書單於考前提供給學生	■沒有