BI **Norwegian School of Management**

Department of Economics

Case for:	**EXC 23041 Statistics**
Case out:	**03.06.2005, 09.00**
Exam:	17.06.2005, 09.00-12.00
Number of pages:	3

General information

The case analysis will be the basis for 15 out of the 30 multiple choice questions. You have to bring the case text and the results of your analysis to the exam. Your analysis will hopefully supply the answers to the exam questions. You will not be required to hand in your analysis.

The case is relatively open. The questions invite to different approaches and use of different statistical methods. You should focus on the approach you find the most interesting and the methods you find to be the most relevant.

As you do not know in advance the questions that will be asked, your analysis should be a broad one. The questions in the multiple choice exam are posed in such a way that, even if you haven't worked out the exact answer required, a thorough analysis of the case will enable you to choose the right answer.

You can analyse the case on your own or together with a group of other students. What is important is that you acquire an insight into the data material, that you understand the analytical methods used and that you are able to draw the right conclusions. The multiple choice exam is an individual exam.

Case: Kindergarten coverage in Norwegian municipalities

The question of whether Norwegian municipalities offer sufficient kindergarten places is a recurrent theme in political debate. Politicians promise, but results appear to be wanting. In this case, you are supposed to investigate factors that have impact on municipal kindergarten coverage (the percent of children 1-5 years old that have a place in kindergarten).

We have selected altogether 17 variables in four categories from the Central Bureau of Statistics' database of municipalities 2004:

Financial key figures

- *Net operating result* in percent of operating revenues
- *Long-term debt* in percent of operating revenues
- *Net loans*, NOK per inhabitant

Budget priorities (NOK)

- Net operating expenses per inhabitant 1-5 years old, *kindergarten*
- Net operating expenses per inhabitant 6-15 years old, *primary school*
- Net operating expenses per inhabitant, *health*
- Net operating expenses per inhabitant, *nursing and day-care*
- Net operating expenses per inhabitant 20-66 years, *social service*
- Net operating expenses per inhabitant 0-17 years, *juveniles*
- Net operating expenses per inhabitant, *administration*

Coverage

- *Kindergarten coverage* (%)
- Percent of inhabitants over 67 years receiving home service, *home service coverage*
- Percent *single rooms* in municipal institutions
- Percent inhabitants over 80 years living in municipal *institution*
- Public owned *housing* per 1000 inhabitants

Productivity

- Average *class size*, primary school
- *Road* maintenance costs, NOK per kilometre

We have made a selection of 262 municipalities, which you may consider a random sample of Norwegian municipalities. You may download the data as an Excel file from the course net page: http://www.bi.no/users/fag87027/met8006.htm. Even if you should find reason to question some of the records, you are supposed to use the data as they are.

DESCRIPTIVE STATISTICS

Compute key figures (observatory values) for, and examine the distribution of the variable *kindergarten coverage*

MODEL 1

Make a linear regression model with kindergarten coverage as a dependent variable and the 16 other variables as independent ones.

Analyze the model and examine the result. (Model control is unnecessary)

MODEL 2

Make a linear regression model where kindergarten coverage is dependent variable and the following five independent variables:

1. *Long-term debt* in percent of operating revenues
2. *Net loans* per inhabitant
3. Net operating expenses per inhabitant 1-5 years old, *kindergarten*
4. Net operating expenses per inhabitant 0-17 years, *juveniles*
5. *Road* maintenance costs per kilometre

− Analyse the model and evaluate the result with regard to the assigned problem.

− Compute the residuals and decide whether it is reasonable to assume a normal distribution.

− Which municipalities in the sample have especially good or bad kindergarten coverage compared to what one would expect according to the regression analysis?