Institutt for samfunnsøkonomi

Case for: **EXC 23041 Statistics**

Case out: **02.12.2004, 09.00**

Exam: 16.12.2004, 09.00-12.00

Number of pages: 4

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 1: Blood pressure

A statistics teacher at BI is using Zestril tablets to reduce his blood pressure. He was, however, worried about possible side effects and wanted to discuss with his doctor whether he really needed the medicine. To be well prepared, he measured his blood pressure over a period of time in advance and brought printouts of data, graphs and tests to the doctor. Table 1 shows systolic and diastolic pressure from 24.09 to 08.10 2004. From 24.09 to 01.10 he used 2,5mg Zestril per day. Thereafter he stopped using Zestril. There are no registrations on the 02.10 and 03.10.

a) Describe the data. Produce graphics and compute statistics.

b) How large is, on average, the difference between diastolic and systolic pressure when Zestril is being used?

c) Does Zestril have an impact on the diastolic pressure; and if so, how large?

According to the doctor, the diastolic pressure ought to be maximum 80.

d) Is blood pressure reducing medicine necessary?

e) Does a 2,5 mg dose of Zestril appear sufficient?

Date	Systolic	Diastolic	Date	Systolic	Diastolic
9.24.04 18:00	156	88	10.4.04 9:00	154	92
9.24.04 21:00	131	77	10.4.04 14:30	158	95
9.25.04 10:00	135	85	10.4.04 17:30	139	85
9.25.04 16:00	121	64	10.4.04 22:30	146	84
9.25.04 19:00	126	79	10.5.04 8:00	154	91
9.25.04 23:00	131	80	10.5.04 13:00	126	80
9.26.04 9:00	128	78	10.5.04 16:30	145	83
9.26.04 13:00	113	71	10.5.04 22:30	141	87
9.26.04 16:30	137	91	10.6.04 7:30	158	89
9.26.04 23:00	144	82	10.6.04 17:30	151	89
9.27.04 8:00	131	80	10.6.04 23:00	149	91
9.27.04 15:00	136	79	10.7.04 8:30	121	78
9.27.04 20:00	107	73	10.7.04 16:00	159	90
9.27.04 23:00	133	76	10.7.04 22:30	126	77
9.28.04 8:00	136	80	10.8.04 8:00	146	93
9.28.04 14:30	147	89	10.8.04 17:00	141	86
9.28.04 18:00	115	72			
9.28.04 22:00	131	74			
9.29.04 8:00	135	91			
9.29.04 17:00	147	92			
9.30.04 7:30	115	73			
9.30.04 12:00	123	75			
9.30.04 14:20	116	70			
9.30.04 22:00	126	75			
10.1.04 9:00	110	74			

Table 1: Blood pressure, with 2,5 mg Zestril 24.09 to 01.10 and without Zestril 04.10 to 08.10.

Case 2: Norwegian smoking habits

Norwegian smoking habits are in focus. The prevalence of smoking among women is especially seen as a problem. The authorities have intensified the efforts to reduce smoking, for instance through new regulations. Your task is to look into this from a statistical point of view.

PART 1: STUDENT SAMPLE

SMOKEHABIT * SEX Crosstabulation

Count

		SEX		Total
		Woman	Man	
SMOKE-	Non-smoker	65	116	181
HABIT	Smoker	5	15	20
Total		70	131	201

Table 2: Smoking habits of a sample of 201 random business students in the Oslo area in 2003. (SPSS-printout)

a) Is there a significant difference between male and female business students regarding the propensity to smoke?

b) According to the Central Bureau of Statistics (SSB), 25% of the women and 27% of the men in Norway were smoking 2003. Is it conceivable that the smoking prevalence among business students is as high as in the rest of the population? (Consider men and women separately.)

PART 2: PROGNOSES FOR THE DEVELOPMENT IN NORWAY

Prevalence of smoking among men and women in Norway					
Year	Men	Women	Year	Men	Women
1980	0,42	0,3	1992	0,37	0,32
1981	0,4	0,31	1993	0,38	0,36
1982	0,4	0,34	1994	0,35	0,31
1983	0,42	0,32	1995	0,33	0,32
1984	0,42	0,34	1996	0,34	0,32
1985	0,42	0,32	1997	0,34	0,33
1986	0,39	0,31	1998	0,34	0,32
1987	0,4	0,33	1999	0,32	0,32
1988	0,41	0,35	2000	0,31	0,32
1989	0,37	0,34	2001	0,3	0,29
1990	0,37	0,34	2002	0,29	0,3
1991	0,36	0,33	2003	0,27	0,25

Table 3: Smoking prevalence in Norway (Source: SSB)

a) Make a chart that shows the time development of the series in table 3. Does a linear regression model with *Year* as an explanatory variable look appropriate, or what do you see?

b) Estimate a simple linear regression model for the development of men's smoking prevalence, and make a prognosis for 2005.

c) Make a regression model of the time development of women's smoking prevalence by using two explanatory variables, *Tid* and *Tid2*. *Tid* is the numbers from 0 to 23. 0 corresponds to 1980, 1 corresponds to 1981, and up to 23, which corresponds to 2003. *Tid2* is the squares of these numbers (0, 1, 4, 9, etc.). How well does the model fit the data? Make a prognosis for 2005. (The reason for using *Tid* and *Tid2* instead of *year* and *year^2*, is that the latter may create numerical problems for the software you are using.)