
Case in: **EXC 23041 Statistics**

Handout date: 07.06.06, 09.00

Examination is held: 21.06.06, 09.00 - 12.00

Total 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 1: E coli O103

The breakout of the E coli epidemic in Norway in the winter of 2006 resulted in the destruction of several tons ground meat produced by Gilde, which is the largest producer of meat products in Norway. The decision to destruct ground meat was made in phase 1 of the infection tracing process, based on statistics that you are supposed to review. The decision later turned out to be erroneous, when the Food and Drug Administration (FDA) discovered that it was a special sausage and not ground meat that was the culprit.

According to Preben Aavitsland at the National Institute of Public Health (NIPH, Press conference 03 03 2006), when the alert was sounded 20.02.2006 six children had become ill with E coli O103, which is a rare bacterium. These were interviewed about what food products they had eaten lately. The interviews were concentrated around 20 selected food products, and the suspicion soon fell on Gilde's ground meat as the only common denominator. A control group of 18 children who were not sick further strengthened the suspicion. The data were:

Cases (sick children): 6 out of 6 had eaten Gilde's ground meat

Control group: 6 out of 18 had eaten Gilde's ground meat

No such clear pattern was found for any other of the 20 food products, and the NIPH alerted the FDA which informed Gilde, which chose to withdraw the suspicious ground meat from the market.

A) *Make yourself familiar with the issue* (Weight 1)

B) *How strong was the suspicion?* Suppose that Gilde's ground meat did not contain E coli O103. You have observed a group of 24 children, of whom 12 had eaten Gilde's ground meat. 6 children became ill of E Coli O103. Think of these as a random sample from the 24. What is the probability that all six sick children had eaten Gilde's ground meat? (Weight 1)

C) *Sources of error:* Think of possible reasons that the conclusion was wrong. (Weight 1)

Case 2: Return on shares

Below, find monthly returns from Statoil and from Storebrand from July of 2001 to February of 2006. (Don't worry about the last month being incomplete.) You may download the data from <http://www.bi.no/users/fag87027/met8006.htm>. You are supposed to apply parametric as well as non-parametric methods in your analysis.

A) *Descriptive statistics:* Make yourself familiar with the data by computing statistics and drawing graphs. (Weight 4)

B) *Confidence intervals and tests:* Are the levels of rate of return different in the two companies? (Weight 4)

C) *Correlation:* What can be said about the correlation of the returns in the two companies? (Weight 2)

D) *Time development:* Is there any development in the returns over time? (Weight 2)

Monthly returns for Statoil and Storebrand

July 2001 to February 2006

Date	Statoil	Storebrand	Date	Statoil	Storebrand
20010731	-0,0652	0,0677	20031128	0,0226	0,0584
20010831	-0,0388	-0,0282	20031230	0,0993	0,0384
20010928	-0,0484	-0,2464	20040130	0,0301	0,0346
20011031	0,0424	-0,1596	20040227	0,0844	0,0692
20011130	-0,0569	0,1304	20040331	0,003	-0,1211
20011228	0,0603	0,0526	20040430	0,0239	0,0356
20020131	-0,0488	0,0096	20040528	0,0198	0,0537
20020228	0,1026	-0,0095	20040630	0,0414	0,051
20020327	0,0853	-0,0192	20040730	-0,0028	-0,038
20020430	0,0214	-0,0471	20040831	0,0028	0,0132
20020531	0,0049	0,07	20040930	0,0966	0,0985
20020628	-0,029	-0,1269	20041029	-0,044	-0,0443
20020731	-0,0597	-0,3722	20041130	0,0515	0,1237
20020830	0,0159	0,0421	20041230	-0,0206	0,0734
20020930	-0,1172	-0,3367	20050131	0,0158	-0,0385
20021031	-0,0442	0,3553	20050228	0,1684	0,0889
20021129	-0,0093	0,1536	20050331	-0,0421	-0,0612
20021230	0,0935	-0,1558	20050429	0,0278	-0,0609
20030131	-0,0855	-0,0577	20050531	0,0369	0,1436
20030228	0,028	-0,1388	20050630	0,1814	0,1395
20030331	0,0273	0,1469	20050729	0,0562	0,0531
20030430	-0,0177	0,1777	20050831	0,1028	-0,0155
20030530	0,1063	0,0351	20050930	0,045	0,0079
20030630	0,0513	-0,0169	20051031	-0,1046	-0,0664
20030731	0,061	0,1	20051130	0,0103	0,0377
20030829	0,0345	0,1881	20051230	0,0544	-0,0605
20030930	-0,063	-0,1003	20060131	0,1806	0,1631
20031031	0,0514	0,1554	20060208	-0,0437	-0,0185

Source: Bernt-Arne Ødegaard, BI