**Module 5: Quantitative bivariate analysis**

**_Please bring a laptop for additional in-class exercises!_**

All study groups should solve the exercises below.

For Exercises 1, 2, and 3, *discuss* the questions below with the other students in your study group, and *write down* your study group's answers in one joint document. *Upload* these answers in a document (.doc, .docx, or .rtf) or PDF in a blog entry in response to the Blog for 'Group Exercises, Module 5' – by 9:00 p.m., Wednesday, October 26.

Answers to Exercise 4 should be prepared so that each group's work can be presented in the discussion class for the other students using a **Power Point Presentation** (max 3 slides).

Note, the two appendices you will need to answer these questions are at the end of this document.

**Exercise 1**

*The purpose of exercises 1-3 is to train your ability to analyse relationships between two variables.*

**Table 1: Political science students by their high school education and their attitudes towards income redistribution. Row percentages. 2007.**

| | Attitude towards income redistribution | | | |
|---|---|---|---|---|
| Type of high school education | Agrees that the income differences still are too big | Agrees that the income redistribution is sufficient | Total | Frequency |
| Language student | 65.5 | 34.5 | 100.0 | 58 |
| Mathematical student | 50.0 | 50.0 | 100.0 | 92 |
| Total | 56.0 | 44.0 | 100.0 | 150 |

Note. 57 respondents were excluded from the analysis because they answered "don't know or "do not agree with any of the statements" on the question concerning income redistribution, or because they have another high school education than the gymnasium.

Table 1 shows the bivariate relationship between high school education and attitudes towards income redistribution. The data come from a survey collected among political science students at Aarhus University in 2007.

1. What can you say about the relationship between high school education and attitudes towards redistribution based on the findings in Table 1? Does there seem to be a difference between math and language students?

**Exercise 2**

Investigate whether there is an association between GDP per capita 1997 and human development (HDI) 1997 by means of Figure 1 in Appendix 1:

1. What is the level of measurement of the variables?
2. Are there observations that appear to be outliers in Figure 1?
3. What is the central pattern in the data in Figure 1? What would you tell your readers?
4. What does the r tell us about the statistical association between GDP per capita 1997 and human development 1997?
5. Does your analysis, which is technically correct, advance our knowledge of the actual causes of human development? Does the relationship you identified satisfy the criteria for a causal relationship? Why or why not?

**Exercise 3**

Investigate whether there is a relationship between GDP per capita in 1997 and the level of democracy in 2006 by means of Appendix 2, Figure 2-3:

1. What is the level of measurement of the variables?
2. Are there observations which appear to be outliers in Figure 2?
3. What is the central pattern in the data in Figure 2? What is the relationship between GDP per capital and the level of democracy?
4. What does the r tell us about the statistical association between GDP per capita in 1997 and the level of democracy in 2006?

5. Does your analysis, which is technically correct, advance our knowledge of the actual causes of democracy? Does the relationship you identified satisfy the criteria for a causal relationship? Why or why not?

6. Figure 3 illustrates the relationship between GDP per capita in 1997 and the level of democracy in 2006 when Arab oil states are excluded (i.e. the United Arab Emirates). Does the exclusion of the Arab oil states change the association between GDP per capita in 1997 and the level of democracy in 2006?

**Exercise 4**

*The purpose of this exercise is to strengthen your ability to present bivariate relationships in graphs and in tables, interpret the graphs and tables substantially, and describe the relationships.*

Table 2: The relationship between agreement with the statement that a child who has not begun primary school will suffer if the mother works outside the home and gender. Count (n =1299). 2002.

|  |  | Agreement with the statement that a child who has not begun primary school will suffer if the mother works outside the home |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Agree completely | Agree somewhat | Neither agree nor disagree | Disagree somewhat | Disagree completely | Row total |
| Gender | Male | 69 | 163 | 67 | 112 | 181 | 592 |
|  | Female | 50 | 139 | 83 | 140 | 295 | 707 |
|  | Column Total | 119 | 302 | 150 | 252 | 476 | 1299 |

Note: The data come from the International Social Survey Program's survey on family life in Denmark. 1379 respondents completed the survey. The 80 respondents who answered "don't know" or failed to provide a response to one of the two questions in table 2 have been excluded from Table 2.

Your task is to make a bivariate analysis of the relationship between gender and agreement with the statement that a child who has not begun primary school will suffer if the mother works outside the home. Agreement was measured on the following scale:

1. Agree completely
2. Agree somewhat

3. Neither agree nor disagree

4. Disagree somewhat

5. Disagree completely

6. Don't know.

In the following analysis, treat gender as the independent variable and the answer for "agreement with the statement that a child who has not begun primary school will suffer if the mother works outside the home" as the dependent variable.

1. What is the level of measurement of the variable "agreement with the statement that a child who has not begun primary school will suffer if the mother works outside the home"?

2. Use the data in Table 2 above to investigate the effect of gender on agreement with the above statement.

   a. With gender as the independent variable in your analysis, calculate the row percentage of the data in Appendix 3.

   b. Using the percentages that you have calculated, present a percentage table (a table of percentages) that displays the relationship between gender and "agreement with the statement that a child who has not begun primary school will suffer if the mother works outside the home".

   c. Using your percentage table, discuss what we can say about the relationship between gender and the agreement with the statement that a child who has not begun primary school will suffer if the mother works outside the home. What would you tell your reader?

   d. Finally, prepare a graph that could serve as an alternative presentation of the table you prepared for part (b) of this question.

**Appendix 1**

**Figure 1: Human development index (HDI) 1997 and GDP per capita 1997. Data from
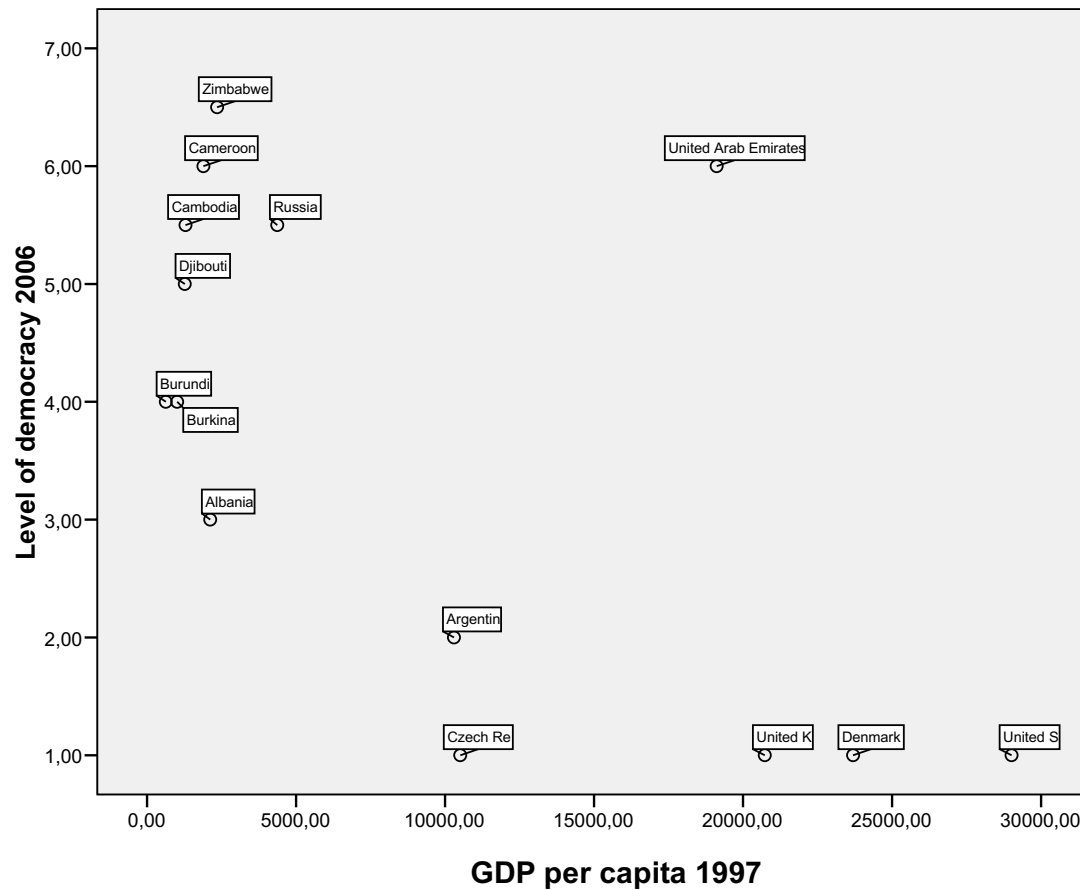Freedom House and DEMSTAR database.**
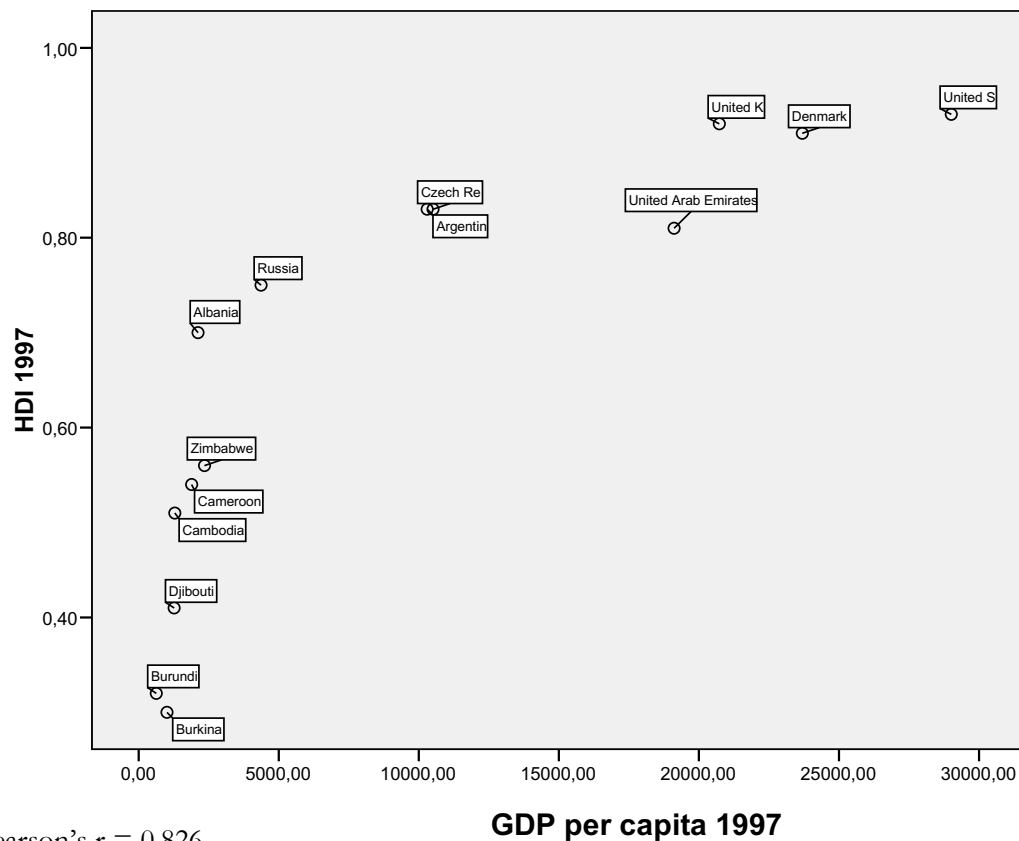


Pearson's r = 0.826

*Note*. HDI 1997 is measured on a scale ranging from 0 to1 – high values indicate a high degree of

human development

**Appendix 2**

**Figure 2: Level of democracy in 2006 and GDP per capita 1997. Data from Freedom House and DEMSTAR database.**



Pearson's r = -0,638

*Note.* The level of democracy is measured on a scale ranging from 1 to 7 – low values indicate a high level of democracy.

**Figure 3: Level of democracy in 2006 and GDP per capita 1997 when Arab oil states are excluded. Data from Freedom House and DEMSTAR database.**
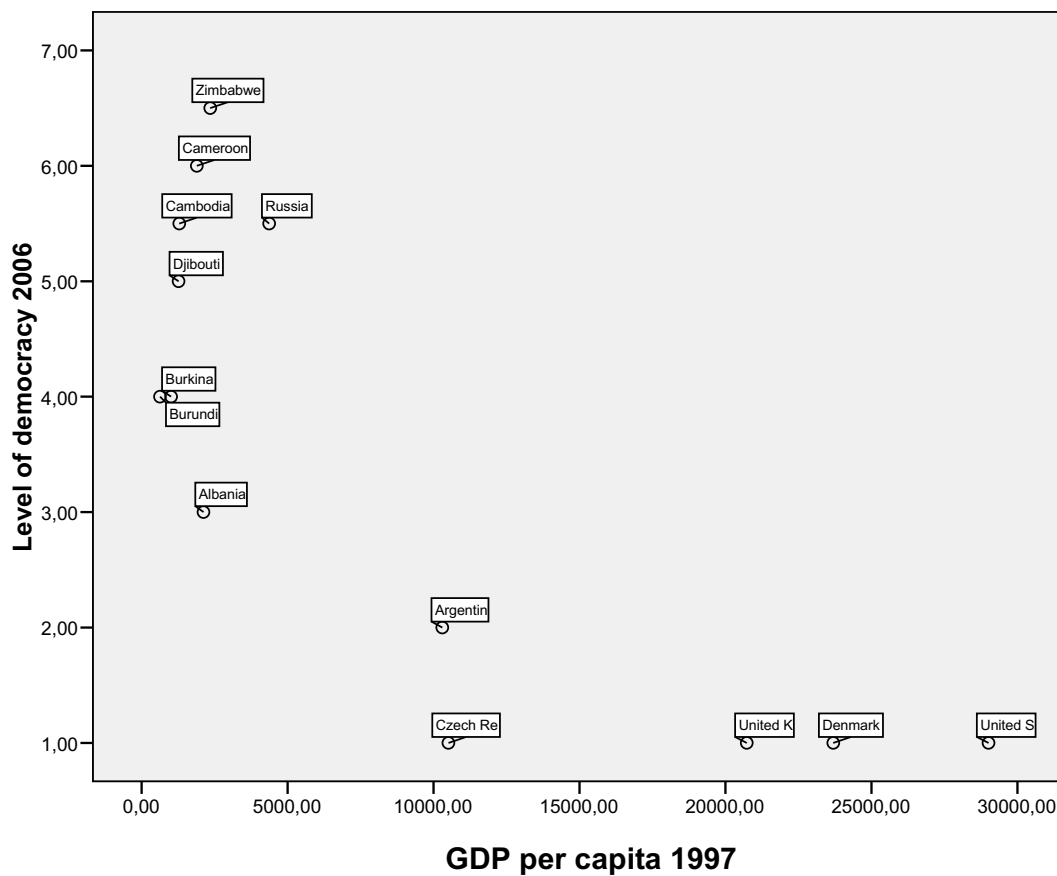


Pearson's r = -0,802

*Note.* The level of democracy is measured on a scale ranging from 1 to7 – low values indicate a high level of democracy.