

Quantitative Methods I

Homework 3

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Please submit by email in PDF format and add R code in a separate .R file. Note that if you do not use Latex, there is an "Equation" entry in Microsoft Word under "Insert" that will allow you to include matrices and other mathematical equations.

(10%) of the grade is used for an overall evaluation of the clarity and presentation of your code.

Questions

1. In the 2009 survey subsequent to the Lisbon Referendum, with 997 respondents, 271 state that the voted 'No' in the referendum. Assume x is a dummy variable, where 1 represents a no vote, 0 otherwise, and p the proportion of ones. Calculate the following manually (no R), presenting the calculation steps:
 - (a) (3%) Variance of x .
 - (b) (4%) Standard error of \hat{p} .
 - (c) (4%) Margin of error assuming $z^c = 1.96$.
 - (d) (4%) 95% confidence interval.
2. Fine Gael would like to focus their activities on attracting new party members. They would like to see what is the target age group for new party members that they need to address. Table 1 shows the age of a random sample of Fine Gael members when they first joined the party.
 - (a) (3%) Calculate the mean and the standard deviation of this sample (using R).
 - (b) (5%) Calculate, with a 99% confidence interval, the mean age of Fine Gael members when they first joined the party.
 - (c) The leaders of Fine Gael think that the margin of error is too large. (5%) What sample size do you need to have a margin of error of 1.5 with 95% confidence?

Age									
50	26	38	45	18	19	25	55	27	62
35	32	21	20	48	56	26	60	34	33
33	25	19	41	42	18	23	46	41	29
22	59	24	32	32	64	40	27	70	35

Table 1: Age of Fine Gael members when they first joined the party

3. For this question, you will need the data from European Parliament Election Study 2009, Voter Study¹. The data set can be found in Stata (ZA5055_v1-1-0.dta) or SPSS (ZA5055_v1-1-0.sav) format.

Perform and interpret the appropriate t -tests for the following statements, reporting the t - and p -values. Note that the country name variable is **t102**.

- The Irish believe that the Irish government is more responsible for economic conditions in Ireland (**q29**) than is the European Union (**q30**). (2%) State the null and alternative hypotheses; (2%) using only the Irish respondents in the survey, (2%) perform the t -test; (3%) interpret the results (approximately 100 words).
- Irish voters are to the left of centre on a left-right ideological scale (**q46**). (2%) State the null and alternative hypotheses; (2%) perform the t -test; (3%) interpret the results (approximately 100 words).
- Voters that were born after 1974 (**q103**) are more likely to be left-wing (**q46**) than older voters. (2%) State the null and alternative hypotheses; (2%) perform the t -test; (3%) interpret the results (approximately 100 words).
- More than half of the Irish voters have been contacted by a candidate or party organisation during the election campaign by flyer through the post (**q21_e**). (2%) State the null and alternative hypotheses; (2%) perform the t -test; (3%) interpret the results (approximately 100 words).
- On average Irish respondents were 25 years old when they stopped full-time education (**q100**). (2%) State the null and alternative hypotheses; (2%) perform the t -test; (3%) interpret the results (approximately 100 words).
- A PhD student in politics does his own survey of 52 young Irish voters between the ages of 18 to 30 and finds that the mean of ideological self-determination in this sample is 5.7 (with a standard deviation of 1.5). Therefore, the PhD student concludes that young voters in Ireland vote differently compared to Irish voters in general. Using R, (2%) determine the mean and standard deviation of left-right self-placement for the Irish sample as a whole. Manually, (2%) calculate the t -statistics for the difference in means, using:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

¹<https://dbk.gesis.org/dbksearch/download.asp?db=E&id=51025>, you will need to register and login using your account. Also, you will need the Irish questionnaire provided on the same page.

TABLE 2 Testing a New 'Clarity of Responsibility' Measure: One-Party vs. Coalition Governments

	One-party governments		Coalition governments				Full sample (all countries)	
	Dependent variable = Whole-government vote = PM's party vote		Dependent variable = Whole government vote		Dependent variable = PM's party vote		Dependent variable = Whole-government vote	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Unemployment	-0.040	0.224	-0.682***	0.161	-0.620***	0.139	-0.109	0.186
Inflation	0.051	0.141	0.320*	0.154	0.279*	0.121	0.130	0.129
Right-wing government	1.29	2.58	1.26	3.11	-0.783	2.73	1.08	1.97
Right govt. *Unemployment	0.247	0.290	0.670*	0.289	0.780**	0.251	0.510**	0.203
Right govt. *Inflation.	-0.252	0.219	-0.445	0.360	-0.498	0.320	-0.371*	0.178
Minority government	3.02*	1.26	1.54	1.40	1.76 ⁺	1.01	2.52*	0.921
Previous vote percentage	-0.231*	0.096	-0.019	0.050	-0.027	0.043	-0.055	0.042
Previous vote swing	-0.181 ⁺	0.102	-0.174 ⁺	0.102	-0.089	0.115	-0.225**	0.070
Constant	6.23	5.20	-1.10	3.57	0.313	1.45	-1.89	2.86
'Coalition' dummy	-	-	-	-	-	-	3.03 ⁺	1.85
'Coalition'*unemployment	-	-	-	-	-	-	-0.513**	0.201
'Coalition'*inflation	-	-	-	-	-	-	0.077	0.175
N	74		68		68		142	
R ²	0.340		0.346		0.355		0.298	
Adjusted R ²	0.259		0.257		0.267		0.239	

⁺ $p < 0.10$, two-tailed * $p < 0.05$, two-tailed ** $p < 0.01$, two-tailed *** $p < 0.001$, two-tailed

Table 2: Testing a New Clarity of Responsibility measure (?).

(5%) Using `pt()`, calculate the p -value and (3%) interpret the results (approximately 100 words).

4. (10%) In the regression table in Table 2 based on Royed, Leyden and Borrelli (2000), there are some stars and plusses next to some of the coefficients. Explain what these symbols mean, in statistical terms? (approximately 200 words). (3%) How do you evaluate the model fit for these models?

Grade conversion scheme

Score	UCD grade	Score	UCD grade	Score	UCD grade	Score	UCD grade
97-100%	A+	85-87%	B	74-76%	C-	54-64%	E+
94-96%	A	83-84%	B-	71-73%	D+	44-53%	E
91-93%	A-	80-82%	C+	68-70%	D	33-43%	E-
88-90%	B+	77-79%	C	65-67%	D-	0-32%	F

References

Royed, Terry J, Kevin M Leyden and Stephen A Borrelli. 2000. "Is 'clarity of responsibility' important for economic voting? Revisiting Powell and Whitten's hypothesis." *British Journal of Political Science* 30(04): 669-698.