New York University
Wilf Family Department of Politics
Fall 2013

Quantitative Research in Political Science I

Professor Patrick Egan

PROBLEM SET 2: Due in class on Monday October 7 at 10 a.m.

A reminder: you may work with others in the class on this problem set, and you are in fact encouraged to do so. However, the work you hand in must be your own. Handwritten work is acceptable, but word-processed work (e.g., using LaTeX) is preferred.

1. WMS Exercise 3.22.
2. WMS Exercise 3.30.
3. WMS Exercise 3.33.
4. WMS Exercise 3.48.
5. WMS Exercises 3.64 and 3.65.
6. WMS Exercises 3.136 and 3.137.
7. WMS Exercise 4.53.
8. WMS Exercises 4.58 and 4.59. Rather than the statistical tables or the WMS "applet," use the Stata functions `normal(z)` and `invnormal(p)` to solve these exercises. (If you need it, help for these functions is easily obtained through Stata's `help` command.)

[THERE IS ONE MORE PROBLEM ON THE NEXT PAGE.]

9. Consider the following standard setup in formal models of electoral competition, in which the utility voter v derives from electing candidate a is written

$$\begin{aligned} U_v(x_a) &= -(x_v - x_a)^2, \text{ where} \\ & \quad x_v \text{ is the voter's ideal policy on the real line, and} \\ & \quad x_a \text{ is the policy (also on the real line) candidate } a \text{ will enact if elected.} \end{aligned}$$

(A concrete way to think about this, for example, is to consider x_a and x_v to be two different tax rates.)

(a) [Easy; not a trick question.] Say that a makes a binding proposal during an election campaign to enact x_a if elected. What proposal (and therefore what policy) maximizes v's utility?

Now consider the case where the voter is unsure about what a will do if elected. A reasonable way to model this scenario would be to consider x_a a random variable with mean μ_a and variance σ_a^2. In this case, rather than evaluating $U_v(x_a)$, the voter evaluates her expected utility, or $E[U_v(x_a)]$.

(b) Supply an expression for $E[U_v(x_a)]$ written only in terms of x_v, μ_a, and σ_a^2.

(c) What is $\frac{\partial E[U_v(x_a)]}{\partial \sigma_a^2}$?

(d) Have we made any assumptions about the distribution of x_a?

(e) As specified above, $U_v(x_a)$ is an example of what is known as a "concave utility function." Based on your analysis here, why is it appropriate that agents with concave utility functions are said to be "risk averse?"

(f) If we assume that voters are risk averse, do candidates have an incentive to be vague in a campaign about the policies they'll enact if elected? (HINT: Your response should explicitly refer to how σ_a^2 affects $E[U_v(x_a)]$.)