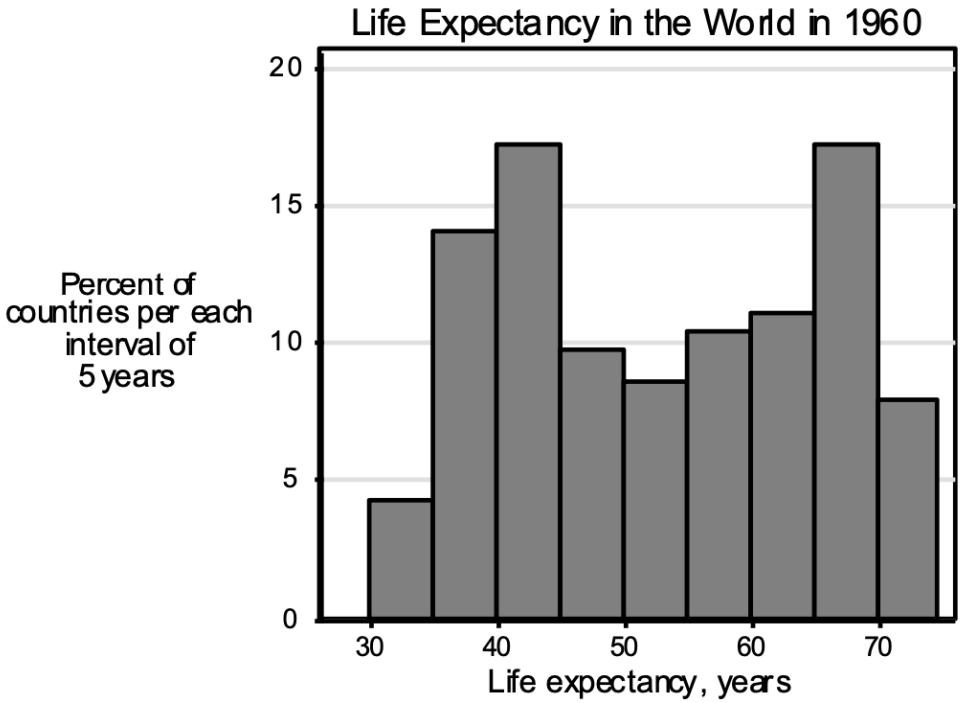
# Quantitative Methods Take-Home Exam

## Section 1 (10 points)

1. The following histogram shows the distribution of life expectancy rates in the world in 1960:




Your job is use the "Second Class" data to make a histogram that is identical to the above histogram in every respect, except that: 1) you show life expectancy rates for the year 2000 instead of 1960, and 2) you change the title as appropriate for the data you are using. Make sure that the text labeling the y-axis is horizontal. After you make the graph, copy it and paste it into a MS Word document.

2. In text that is ***no longer than 1 page long***, describe the distribution of life expectancy across nations in 1960 and in 2000, and also describe how the distribution has changed in this period. In other words, compare the histogram you make with the histogram shown above. Include the appropriate amount of detail and verbal description – not too much and not too little. That is, include some hard detail (numbers), but do not allow your description to be completely dominated by numbers. You can also look up particular countries and their life expectancy (e.g., invoking **list life1960 if country=="country name"**) for illustration.

## Section 2 (5 points)

Use the Standard Normal Table to find the proportion of observations from a standard Normal distribution that falls in each of the following regions. In each case, sketch (either by hand, by graphing software or with Stata) a standard Normal curve and shade the area representing the region.

(1)$z \leq$ –2.25

(2)$z \geq$ –2.25

(3)$z \geq 1.77$

(4)–2.25 $\leq z \leq 1.77$

(5) Find the number z such that the proportion of observations that are less than z in a standard Normal distribution is 0.8.

(6) Find the number z such that 35% of all observations from a standard Normal distribution are greater than z.

## Section 3 (5 points)

In a hypothetical survey of Irish TDs, politicians were asked what they thought the fair and appropriate corporate tax rate should be (It is 12.5% at the moment). A histogram was made to show the distribution of their responses, and the histogram had the shape of a normal curve. The average of their preferences was 15 percent, with an SD of 2 percent. Given this information, use the normal table to answer the following questions:

a. What percent of politicians favored a tax rate above 19 percent?

b. What percent of politicians favored a tax rate above 17 percent?

c. What percent politicians a tax rate between 13 percent and 17 percent?

d. What percent of politicians favored a tax rate above 20 percent?

Note that this example is extremely hypothetical. Of the many things wrong with it, perhaps the most egregious is that the distribution would not be normal. We think it would be bimodal, with Sinn Fein and other centerleft politicians favoring a higher tax rate and centerright politicians probably favouring the status quo rate. Follow the steps as suggested in class and then

write a short answer explaining how you arrived at your results. This answer should also be brief, as those above.

## Section 5 (80 points)

A year after the Russian Federation has launched a full-scale invasion of Ukraine, on February 23, 2023 the United Nations General Assembly (UNGA) has voted on a resolution calling for "a comprehensive, just and lasting peace in Ukraine." Altogether, the resolution received 141 votes in favor, 7 against and 32 abstentions. While at first glance the result may indicate an overwhelming degree of disapproval of Russia, it is however far from unanimous, as many countries exist that either sided with Russia or abstained from supporting this resolution openly. In fact, to abstain is not the same as to be absent. Most scholars of international relations regard abstaining as tacit disapproval of a given resolution, different from mere absences (Bailey, Strezhnev and Voeten, 2017). Abstention can also be interpreted as an equidistant position on the issue, or the lack of a clear position (Peterson, 2006, 102), but not as support.

Irrespective of whether we interpret abstentions as a tacit support for Russia, or an equidistant position, what cannot be denied is that many members of the UNGA still support various Russian-sponsored resolutions and initiatives, which often receive a strong support. For example, in late 2022, that is almost a year since the invasion which was justified on the basis of a "de-Nazification" of Ukraine, as Vladimir Putin has notoriously proclaimed in early 2022, the UNGA has endorsed resolution 77/204 on this very subject, "Combating glorification of Nazism, neo-Nazism and other practices", which Russia has proposed as its main sponsor, and which the Russian Federation has used to improve its global standing and prestige at the international stage in the post-Cold war period. In fact, in 2022 this resolution received 120 votes in favour, 10 abstentions, and 50 against. Despite some defections, 115 members that voted in favour in 2021 did not change their vote in 2022, despite the war. These numbers come from my ongoing research.

**Why do member-states support Russia's initiatives in the United Nations?** This is the question you will attempt to address in this assignment. The question is topical, policy-relevant, and rather interesting, intrinsically. It is also possible to make a genuine contribution to scholarly debate when you address it in this research paper.

Rather than explaining support for a particular resolution, you will explain voting similarity between member-states, and Russia, on all recent resolutions, in the UN General Assembly. That is, your task is to explain why member-states generally align themselves with Russia's initiatives in the UNGA. The dependent variable is *PctAgreeRUSSIA*. This measure accounts for the percent of votes a member-state agrees with Russia, that is, when it votes in the same way, in a given session, overall. A higher score stands for a higher degree of agreement.

Typically, member-states vote on around 100-120 resolutions per annual UNGA session, but the number of resolutions is larger as many resolutions are adopted by consensus, without a vote. The data are from Bailey, Michael A., Anton Strezhnev, and Erik Voeten. "Estimating dynamic state preferences from United Nations voting data." Journal of Conflict Resolution 61.2 (2017): 430-456. Voting similarity is computed by analyzing the agreement between Russia and another member-states in a given session, if there is an agreement on 1 = "yes" or approval for an issue; 2 = abstain, 3 = "no" or disapproval for an issue; abstention is counted as half-agreement with a yes or no vote.

A data set has been compiled for you which includes various political, economic and societal indicators, from various distinct datasets. Each variable has a self-explanatory label to assist in understanding what that variable accounts for. This dataset includes a number of variables that measure democracy, institutions, economic development, conflict, etc, in different countries. Examine the labels; they should be self- explanatory.

In this dataset you will find the dependent variable, which is *PctAgreeRUSSIA*. A low score indicates that a country rarely votes in the same manner as Russia does, and a high score indicates that a country votes similarly to Russia almost always. In fact a score of 1 means it is Russia.

The paper should be written for the benefit of an audience that knows as much statistics as you do, but knows nothing about UN votes and the determinants of international cooperation. Thus, you can and **should** use the tools developed in this course – graphs and regression models – but you must explain carefully what you are doing. Although the assignment involves the analysis of statistical data, you should try to write your paper in mostly non-technical terms. You also should try to avoid jargon, making the text of your essay as intelligible as possible to a non-statistically oriented audience. That is, your essay should be an actual as-if research paper, not a string of technical comments, and you should be trying to communicate with an ordinary intelligent person, not a statistician.

The paper must include one table of descriptive statistics, at least one scatterplot or other descriptive figure(s), one multiple regression table, as well as discussion and, if possible, presentation of substantive effects. There could be more figures and tables than that, but please do not be excessive.

Use of multiple regression to explain *PctAgreeRUSSIA* should be at the center of your analysis. I do not limit the choice of variables selected for the analyses. The choice of independent variables, and whether you include 2-3 or 7-10 or 12-15, is entirely up to you. Do not include too few or too many. Your analysis should also include discussion and presentation of substantive effects.

**Some points to look out for:**

Do not include variables you do not explain in your paper. Conversely, explain every variable you put in your regression model and why it is there.

Do not add too many independent variables to your regressions. The more coefficients we want to estimate, the greater a number of observations we need. However, we are limited in this data to the number of countries in the world. Thus the data cannot estimate too many effects with any accuracy.

Following a brief introduction and a theory section or a literature review (very brief), Part 1 should identify and justify the particular variables you use as independent and dependent variables in your multiple regression. Potential z-factors should be discussed and selection of control variables should also be discussed in Part 1. Justifications should refer to the relevant literature. While you are not expected to write a full-blown literature review, you should write a short one. You can start with Eric Voeten's work on the UN politics but there are many scholars who work in the area of UN and UN General Assembly politics.

Part 2 should conduct the tests described in Part I. You should include at least one graph of some kind (scatterplot, box plot, histogram) to give an overview of your data. And you should report and interpret the results of at least one multiple regression, as developed in Part 1. You also need to include a table of descriptive statistics, but this table can also be included in Part 1 as well. Your scatterplot(s) should be properly labeled, and should include a trend line and your regression table(s) should be prepared in keeping with the formats suitable for professional publication, as described and explained in class (hint: use estout). In interpreting substantive significance of the relationships you examine, be sure to provide information on the average and spread of the variables in question. You should discuss the causal relationship between variables.

I prefer if you include no more than one regression table (combine several models in one table if you have more than one model) and three-four graphs (plus the descriptive statistics table). But there could be two tables if it makes sense to you. All tables and graphs should be presented in a professional manner.

In Part 3 of your essay, you should discuss the results of your statistical analysis and reach conclusions about the effect of your chosen predictors on their vote similarity with Russia in the UN. What are the strongest factors, or a factor, that explain why member-states support Russia's initiatives, or generally vote in the same manner with this country? You may reach any conclusion you wish, so long as it is justified on the basis of the preceding analysis. If,

for some reason, your analysis does not support any strong conclusions, you should use Part 3 to explain why no strong conclusions are possible. Your paper should include a title, an introduction, and a conclusion. It should also be relatively long, not less then eight pages (I do not limit if you want to write a long paper, but do not be excessive), like an academic paper, not a brief statistics assignment with brief answer and technical jargon.

This is a challenging assignment. But I am sure you will do great. Good luck!