Part I

Task 1

Table 1. Logistic Regression (Bias-Reduction) on Occurrence of Revolutions With Goldstone Classification, 2000–2019.

	Dependent variable: revolution onset (=1)			
	(1)	(2)	(3)	(4)
Regime type, *t-1*:				
Full autocracy [refernce]	-	-	-	-
Partial autocracy	1.307*** (0.456)	1.050** (0.440)	1.212*** (0.447)	1.217*** (0.463)
Partial democracy	0.958* (0.502)	0.624 (0.420)	0.600 (0.546)	0.600 (0.555)
Factional democracy	1.125*** (0.420)	0.923** (0.371)	0.932* (0.526)	0.935* (0.537)
Full democracy	−1.597** (0.758)	−1.732** (0.704)	−1.087 (0.961)	−1.096 (0.943)
Population, ln		0.235*** (0.047)	0.180*** (0.026)	0.179*** (0.027)
GDP per capita (2011$), ln, *t-1*			−0.629*** (0.126)	−0.648*** (0.101)
Gini coefficient (income), *t-1*			1.317 (3.508)	1.348 (3.517)
Unemployment, *t-1*			0.004 (0.009)	0.004 (0.009)
Median age				0.008 (0.022)
Constant	−4.036*** (0.814)	−5.825*** (1.155)	−1.750 (2.917)	−1.748 (2.919)
Nobs	3107	3003	2799	2799
AIC	875.14	820.51	771.84	773.97
N events	102	95	92	92

Note. *$p < .1$; **$p < .05$; ***$p < .01$; region and year fixed effects are included in all models; clustered on region robust standard errors are in parentheses.

In all four models **Full autocracy** is the reference category.

Model 1 (Regime types):

- **Partial autocracy**: The coefficient is 1.307, it is a significant variable, because the ratio between log-odds and the standard error is approximately 2.9, which is greater than 2, and p-value < 0.01 in the table. The positive number means that partial autocracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(1.307) = 3.7, so a partial autocracy is 3.7 times more likely to have a revolution compared to a full autocracy;
- **Partial democracy**: The coefficient is 0.958, it is weak evidence, because the ratio between log-odds and the standard error is approximately 1.9, which is near 2, and p-value < 0.1 in the table. The positive number means that partial democracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(0.958) = 2.6, so a partial democracy is 2.6 times more likely to have a revolution compared to a full autocracy;
- **Fractional democracy**: The coefficient is 1.125, it is a significant variable, because the ratio between log-odds and the standard error is approximately 2.7, which is greater than 2, and p-value < 0.01 in the table. The positive number means that fractional democracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(1.125) = 3.1, so a partial democracy is 3.1 times more likely to have a revolution compared to a full autocracy;
- **Full democracy**: The coefficient is -1.597, it is a significant variable, because the ratio between log-odds and the standard error is approximately 2.1, which is greater than 2, and

p-value < 0.05 in the table. The negative number means that full democracies are less likely to experience revolutions compared to full autocracies. The odds ratio is exp(-1.597) = 0.2, so a full democracy is 0.2 times less likely to have a revolution compared to a full autocracy.

Model 2 (Regime types + Population):

- **Partial autocracy**: The coefficient is 1.050, it is a significant variable, because the ratio between log-odds and the standard error is approximately 2.3, which is greater than 2, and p-value < 0.05 in the table. The positive number means that partial autocracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(1.050) = 2.9, so a partial autocracy is 2.9 times more likely to have a revolution compared to a full autocracy;
- **Partial democracy**: The coefficient is 0.624, it is an insignificant variable, because the ratio between log-odds and the standard error is approximately 1.5, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(0.624) = 1.9;
- **Fractional democracy**: The coefficient is 0.923, it is a significant variable, because the ratio between log-odds and the standard error is approximately 2.5, which is greater than 2, and p-value < 0.05 in the table. The positive number means that fractional democracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(0.923) = 2.5, so a partial democracy is 2.5 times more likely to have a revolution compared to a full autocracy;
- **Full democracy**: The coefficient is -1.732, it is a significant variable, because the ratio between log-odds and the standard error is approximately 2.5, which is greater than 2, and p-value < 0.05 in the table. The negative number means that full democracies are less likely to experience revolutions compared to full autocracies. The odds ratio is exp(-1.732) = 0.18, so a full democracy is 0.18 times less likely to have a revolution compared to a full autocracy;
- **Population**: There is a positive correlation between population and revolutions. The coefficient is 0.235, it is a significant variable, because the ratio between log-odds and the standard error is 5, which is greater than 2, and p-value < 0.01 in the table. The odds ratio is exp(0.235) = 1.3, which means that, when population increases by 1 unit, the odds of taking 1 increases by (exp(0.235) - 1)*100% = 26%.

Model 3 (Model 2 + GDP per capita, Income and Unemployment):

- **Partial autocracy**: The coefficient is 1.212, it is a significant variable, because the ratio between log-odds and the standard error is approximately 2.7, which is greater than 2, and

p-value < 0.01 in the table. The positive number means that partial autocracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(1.212) = 3.4, so a partial autocracy is 3.4 times more likely to have a revolution compared to a full autocracy;

- **Partial democracy**: The coefficient is 0.600, it is an insignificant variable, because the ratio between log-odds and the standard error is approximately 1.1, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(0.600) = 1.8;
- **Fractional democracy**: The coefficient is 0.932, it is weak evidence, because the ratio between log-odds and the standard error is approximately 1.8, which is near 2, and p-value < 0.1 in the table. The positive number means that fractional democracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(0.932) = 2.54, so a partial democracy is 2.54 times more likely to have a revolution compared to a full autocracy;
- **Full democracy**: The coefficient is -1.087, it is an insignificant variable, because the ratio between log-odds and the standard error is approximately 1.1, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(-1.087) = 0.3;
- **Population**: There is a positive correlation between population and revolutions. The coefficient is 0.180, it is a significant variable, because the ratio between log-odds and the standard error is approximately 7, which is greater than 2, and p-value < 0.01 in the table. The odds ratio is exp(0.180) = 1.2, which means that, when population increases by 1 unit, the odds of taking 1 increases by (exp(0.180) - 1)*100% = 20%;
- **GDP per capita**: There is a negative correlation between GDP and revolutions. The coefficient is -0.629, it is a significant variable, because the ratio between log-odds and the standard error is approximately 5, which is greater than 2, and p-value < 0.01 in the table. The odds ratio is exp(-0.629) = 0.53, which means that, when GDP increases by 1 unit, the odds of taking 1 decreases by (exp(-0.629) - 1)*100% = 47%;
- **Gini coefficient**: The coefficient 1.317 is positive but not significant, because the ratio between log-odds and the standard error is approximately 0.4, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(1.317) = 3.7. So we cannot determine the direction of the relationship between income inequality and revolutions;
- **Unemployment**: The coefficient 0.004 is positive but not significant, because the ratio between log-odds and the standard error is approximately 0.4, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(0.004) = 1. So we cannot determine the direction of the relationship between unemployment and revolutions.

Model 4 (Model 3 + Median age):

- **Partial autocracy**: The coefficient is 1.217, it is a significant variable, because the ratio between log-odds and the standard error is approximately 2.6, which is greater than 2, and p-value < 0.01 in the table. The positive number means that partial autocracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(1.217) = 3.38, so a partial autocracy is 3.38 times more likely to have a revolution compared to a full autocracy;
- **Partial democracy**: The coefficient is 0.600, it is an insignificant variable, because the ratio between log-odds and the standard error is approximately 1, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(0.600) = 1.8;
- **Fractional democracy**: The coefficient is 0.935, it is weak evidence, because the ratio between log-odds and the standard error is approximately 1.7, which is near 2, and p-value < 0.1 in the table. The positive number means that fractional democracies are more likely to experience revolutions compared to full autocracies. The odds ratio is exp(0.935) = 2.55, so a partial democracy is 2.55 times more likely to have a revolution compared to a full autocracy;
- **Full democracy**: The coefficient is -1.096, it is an insignificant variable, because the ratio between log-odds and the standard error is approximately 1.2, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(-1.096) = 0.3;
- **Population**: There is a positive correlation between population and revolutions. The coefficient is 0.179, it is a significant variable, because the ratio between log-odds and the standard error is approximately 7, which is greater than 2, and p-value < 0.01 in the table. The odds ratio is exp(0.179) = 1.2, which means that, when population increases by 1 unit, the odds of taking 1 increases by (exp(0.179) - 1)*100% = 20%;
- **GDP per capita**: There is a negative correlation between GDP and revolutions. The coefficient is -0.648, it is a significant variable, because the ratio between log-odds and the standard error is approximately 6, which is greater than 2, and p-value < 0.01 in the table. The odds ratio is exp(-0.648) = 0.52, which means that, when GDP increases by 1 unit, the odds of taking 1 decreases by (exp(-0.648) - 1)*100% = 48%;
- **Gini coefficient**: The coefficient 1.348 is positive but not significant, because the ratio between log-odds and the standard error is approximately 0.38, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(1.348) = 3.8. So we cannot determine the direction of the relationship between income inequality and revolutions;
- **Unemployment**: The coefficient 0.004 is positive but not significant, because the ratio between log-odds and the standard error is approximately 0.4, which is less than 2, and

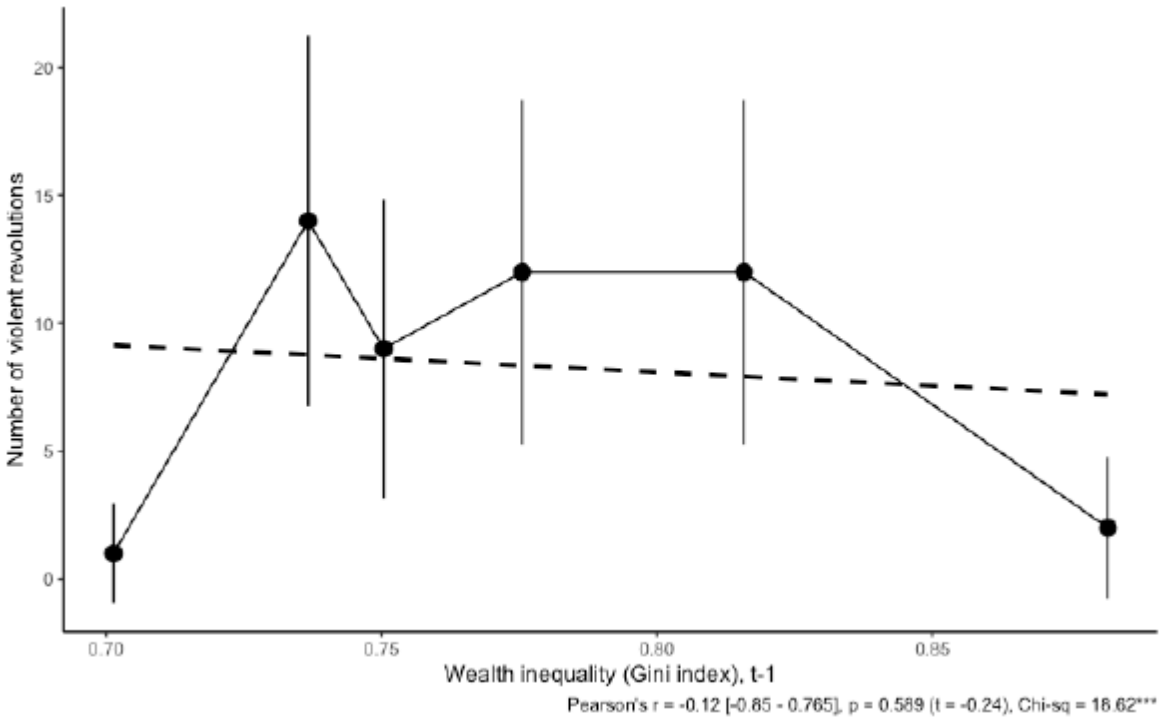
p-value is not presented in the table. The odds ratio is exp(0.004) = 1. So we cannot determine the direction of the relationship between unemployment and revolutions;

- **Median age**: The coefficient 0.008 is positive but not significant, because the ratio between log-odds and the standard error is approximately 0.36, which is less than 2, and p-value is not presented in the table. The odds ratio is exp(0.008) = 1. So we cannot determine the direction of the relationship between unemployment and revolutions.

Task 2

- Democracies are less likely to experience revolutions compared to autocracies.
- There is a curvilinear relationship between economic development (GDP) and revolutions.
- Socioeconomic factors (population, GDP, income inequality and unemployment) play a significant role in influencing revolution likelihood.

Task 3



Based on the graph, there is a weak positive relationship between the Gini index of wealth inequality (lagged) and the probability of unarmed revolution onset (less violent). This means that as the Gini coefficient increases (more wealth inequality), the probability of unarmed revolution onset also increases. But, the strength of this relationship is weak, considering that the data points are scattered, and there is no clear linear trend. Pearson's r = -0.12, providing a weak negative correlation, but p-value > 0.05 (0.589), which means the correlation is not statistically significant.

Part II

Task 1

RQ1: What is the effect of inequality on probability of revolution onset?

Task 2

Hypotheses:

- ***Null Hypothesis (H0)***: There is no significant relationship between income inequality and the probability of revolution onset.
- ***Alternative Hypothesis (H1)***: There is a significant positive relationship between income inequality and the probability of revolution onset (i.e., higher inequality increases the probability of revolution).

Operationalization:

- ***Dependent Variable***: Revolution Onset (Coded as 1 for the start of a revolution and 0 for no revolution in a given country-year). Binary variable, limited to specific events (revolutions).
- ***Independent Variable***: Income Inequality (Measured by the Gini index, ranging from 0 (perfect equality) to 1 (perfect inequality)). Continuous variable, represents the distribution of income within a country, might not capture all aspects of inequality.

Statistical Model:

The ***Logistic regression model*** is the most suitable approach for this analysis. This is justified because the dependent variable in this study is binary, and the logistic regression estimates the odds ratio, which indicates the relative likelihood of an event occurring with a change in the predictor variable (in this case, the Gini coefficient) by one unit, while holding other factors constant.

Pitfalls and Solutions:

- ***Endogeneity***: Income inequality might be influenced by factors that also influence revolution onset (e.g., political instability). This could lead to spurious correlations. ***Solution***: Usage of instrumental variables or lagged Gini index to address potential endogeneity.
- ***Reverse Causality***: Revolutions might lead to increased inequality, not the other way around. ***Solution***: Usage of panel data to account for the temporal order of variables.
- ***Omitted Variable Bias***: Other factors not included in the model (e.g., government repression, ethnic divisions) might influence revolution onset. ***Solution***: Including relevant

control variables in the model based on prior research and theoretical understanding. However, multicollinearity needs to be considered.

- ***Measurement Error***: The Gini index is based on income surveys, which might be inaccurate. Revolutions might be underreported. ***Solution***: Usage of multiple sources for income inequality data and triangulate revolution data with different event datasets.