Political Economics

January 25, 2021 (three-hour, open-book exam)

This exam question consists of 6 pages in total

Answers only in English.

A take-home exam paper cannot exceed 10 pages – and one page is defined as 2400 keystrokes

The paper must be uploaded as <u>one PDF document</u>. The PDF document must be named with exam number only (e.g. '1234.pdf') and uploaded to Digital Exam.

Instructions

This exam set consists of three problems with one or more questions. Answer all problems and questions. Each question has a suggested length, written in parentheses at the end the question. You may use these suggestions as a guide on how to prioritize your time; there is no penalty for writing more than indicated in the suggestions. But shorter answers may also suffice.

Problem 1

The imaginary country of Deconomica has a population that consists of three equally sized groups called group P, M, and R. Let citizens in the country be indexed by i and let groups be indexed by j with $j = \{P, M, R\}$. Each group has size $N_j = 1$. Citizens have different income levels depending on which group they belong to. We let y_j be the income level for the citizens in group j. Let y denote average income for all citizens in the population.

There is a proportional tax, τ, on income which is used to finance spending on some public good. Citizens get utility from private consumption and the public good. Preferences for individual i, belonging to group j, are described by the utility function:

$$u_{ij} = c_i + 2g^{\frac{1}{2}}$$

where c_i denotes private consumption of individual i, and g denotes per capita level of spending on the public good.

The tax rate and level of government spending in the economy is decided by representative democracy. There are two candidates, candidate A and candidate B, engaging in electoral competition. The candidates are purely office-motived and care only about winning the election. The timing is as follows: 1) Candidates announce their policy platforms, 2) Citizens observe the platforms and vote for the candidate that they prefer (if they are indifferent between the platforms, they flip a coin), 3) The elected candidate implements his/her announced policy.

1A. Write down the individual budget constraint in terms of c_i, y_j and τ. Write down the government budget constraint in terms of τ, y and g. Use these to write down the indirect utility function as a function of g. Then derive the preferred level of government spending for each individual, $g_{ij}*$. How does the preferred level of government spending depend on an individual's income? Explain the intuition behind this result. *(Suggested length: 10-15 lines)*

The private budget constraint for an individual i of group j is $c_{ij} = (1 - \tau)y_j$. The government budget constraint is $g(N_P + N_M + N_R) = \tau(y_P N_P + y_M N_M + y_R N_R) \Longleftrightarrow g = \tau y$.

Inserting the constraints into the utility function gives the following indirect utility function:

$$u_{ij} = \left(1 - \frac{g}{y}\right)y_j + 2g^{\frac{1}{2}}$$

Taking the derivative with respect to g, setting it equal to zero and isolating g gives the following preferred level of spending on public goods for citizen i of group j:

$$g_{ij}* = \frac{y^2}{y_j{}^2}$$

The individual's preferred level of government spending depends on average income in the population relative to the income of the individual (which in this case is the same for all individuals of the same group). The higher the income of the individual relative to the average income, the

lower the preferred level of public good provision. This comes from the fact that high-income individuals pay more in taxes (as taxes are proportional to income) but receive the same level of government spending as everyone else. This is a classic income-based model of preferences for redistribution.

1B. What is the equilibrium level of spending on the public good? Explain the intuition behind the equilibrium policy. Which electoral forces are at play? *(Suggested length: 5-10 lines)*

With single-peaked preferences and Downsian electoral competition, the median voter theorem applies. This means that the median voter's preferred level of government spending is a Condorcet winner and is the unique policy equilibrium in the model. In this particular example, the median voter is part of group M (as all three groups are of equal size). Hence, the policy equilibrium is

$$g^* = g_M{}^* = \frac{y^2}{y_M{}^2}$$

In this case of office-motivated politicians, politicians maximize their chances of winning. Since politicians can credibly commit to their pre-election policy platform, both candidates maximize their chances of winning by proposing the preferred policy of the median voter which is then the equilibrium policy. There is hence full convergence to the median voter's bliss point in this model.

1C. Assume that the groups in the population have the following incomes: $y_P = 2, y_M = 4, y_R = 12$. What does the income distribution look like: Is there income equality, and what is the position of the mean relative to the median? What is the equilibrium level of government spending given these group incomes? *(Suggested length: 5 lines)*

Income is not equally distributed across the population and the median income is below the average income. The equilibrium level of spending on public goods is

$$g_1{}^* = g_M{}^* = \frac{y^2}{y_M{}^2} = \frac{(\frac{18}{3})^2}{4^2} = \frac{9}{4} = 2.25$$

1D. Assume that income in group P declines by 50%. How does this affect the income distribution? What is the new equilibrium level of government spending? How does this compare to the result in 1C and why? Briefly explain how your results here match with the empirical literature on inequality and levels of redistribution. Give examples from the empirical literature or the real world if possible. *(Suggested length: 15-20 lines)*

Income in group P declines from 2 to 1. This means that the poorest group becomes poorer. This could be perceived as an increase in inequality if, for instance, one measures inequality as the relative income between the richest and the poorest citizen in the population. The change, however, decreases the distance between the median and the average income. The new equilibrium level of government spending is

$$g_2{}^* = g_M{}^* = \frac{y^2}{y_M{}^2} = \frac{(\frac{17}{3})^2}{4^2} = 2.01 < g_1{}^* = \frac{(\frac{18}{3})^2}{4^2} = 2.25$$

As the poor group becomes poorer, the average income declines, while the income of the median voter stays the same. This means that the gap between the average and the median income becomes smaller. This leads to a lower level of government spending in equilibrium. This is due to the fact that the median voter becomes relatively richer (compared to the average) and hence benefits relatively less from government spending financed by a proportional tax on income. The prediction from the income-based model of government spending and redistribution is that an increase in inequality coming from the rich becoming richer (the gap between the median and the average income increases) will lead to an increase in government spending. An increase in inequality coming from the poor becoming poorer (the gap between the median and the average income

decreases), however, will lead to lower government spending, like in this example. There has generally been little empirical evidence in support of the income-based model's predictions about the relationship between inequality and levels of redistribution across countries and within countries over time. Most notably, comparing the U.S. and Europe, it does not seem to be the case that more unequal societies have a larger welfare state (see for instance Alesina et al., Brookings, 2001). Also, looking within the U.S. over time, increases in inequality does not seem to have increased the demand for or the actual level of redistribution (documented in for instance Kuziemko et al., AER, 2015).

1E. Assume that the income of group P is back to the previous level of $y_P = 2$. Assume that there is a group of young people in Deconomica who have not been allowed to work or allowed to vote until now, but are now allowed to both work and vote. Call this group $j = K$ and assume that they are slightly larger in size than each of the three other groups (i.e., slightly larger than 1) and that they have the same income as group P, that is $y_K = 2, y_P = 2, y_M = 4, y_R = 12$. What is the new equilibrium level of government spending in the economy? How does it compare to the levels in 1C and 1D and why? Briefly explain how your results here match with existing empirical evidence on redistributive politics. Give examples from the empirical literature if possible. *(Suggested length: 15-20 lines)*

Because the new group of taxpayers and voters is slightly larger than each of the other groups, the median voter changes to be a voter from group K or P (which have the same income level of 2 and now constitute a majority). Hence, the new equilibrium level of government spending is

$$g_3^* = g_{K,P}^* = \frac{y^2}{y_{K,P}^2} = \frac{(\frac{20}{4})^2}{2^2} = \frac{25}{4} = 6.25 > g_1^* > g_2^*$$

The introduction of a new low-income group leads to a decline in average income relative to the two previous scenarios. This in isolation would lead to a lower level of redistribution (as in 1D). However, as the new low-income group also votes, the median voter changes to become a voter from one of the low-income groups (K and P). This generates a larger gap between median and average income than in the previous scenarios which leads to a larger level of government spending than in both 1C and 1D. One prediction from the model hence is that enfranchisement of poorer voters will lead to more redistribution. This is because enfranchisement of poorer voters affects who the median voter is and changes it to be one of lower income without changing the identity of the average taxpayer (in this example, however, average income changed as well but not enough to offset the effect from the change in the median voter). There is some evidence in the empirical literature in support of this prediction. For instance, Fujiwara (Econometrica, 2015) finds that a de facto enfranchisement of poorer (less educated) voters leads to more redistribution. We have also in class talked about Aidt et al. (EER, 2006) who document a positive correlation between historical extensions of franchise to poorer voter groups and government spending consistent with the model predictions.

Assume now that voters in each group care not only about policy but also about identity of the candidates. Identity is not something that the candidates can change. While candidates know voters' policy preferences, there is uncertainty about what the exact identity preferences of voters are. An individual i of group j will vote for candidate A if

$$u_{ij}(g_A) > u_{ij}(g_B) + \sigma_{ij}$$

where σ_{ij} captures the individual's preference for one candidate's identity relative to the other candidate's identity. This parameter allows individuals to differ with respect to identity preferences within their group and is uniformly distributed on $\left[-\frac{1}{2\phi_j}, \frac{1}{2\phi_j}\right]$.

1F. It turns out that people in the middle-income group, M, primarily care about which policy platform gets implemented, while identity of the candidates is largely irrelevant to them. The recently enfranchised group of young voters, on the other hand, have strong and opposing opinions about identity of the candidates – for instance their looks, age, and gender – and this is important to them when choosing between candidates. Explain intuitively (no formal derivations required) what this information tells you about the size of ϕ_M and ϕ_K. Do they differ in magnitude and how? With the information about how much M and K care about identity of the candidates, and with your knowledge from class about this type of model and type of voter preferences, explain whether each group's influence on the equilibrium policy differs from the situation in 1A-E where voters cared only about policy. Do identity preferences of voters affect their influence on the equilibrium policy and why? *(Suggested length: 15-20 lines)*

The parameter ϕ_j determines the interval on which the individual identity preference parameters σ_{ij} are distributed within each group. A high value of ϕ_j means that the interval is narrow. Hence, if a group has a high ϕ_j this means that the identity preferences within that group are distributed on a narrow interval around zero, and identity preferences in that group therefore do not have a big influence on voters' preferences for one candidate over the other. These types of voters are sometimes called ideologically moderate voters (when ideology is considered to be something that candidates cannot change, such as identity). These voters can relatively easily be swayed by changes in policy and are therefore also sometimes called swing voters. In the example with groups M and K, group M is the relatively more ideologically (with respect to identity preferences) moderate of the two groups. The fact that M does not care about politician identity and K cares a lot when choosing between candidates, is modelled as ϕ_M being greater than ϕ_K. Compared to the situation in question 1A-E where voters cared only about policy, the introduction of identity preferences gives higher weight to groups with more moderate identity preferences in the policy equilibrium. This means that the equilibrium policy moves closer to the bliss point of these more moderate groups. In our example, this means that identity preferences give group M more influence over the equilibrium level of government spending. With identity preferences in the model and uncertainty about these preferences, the probability of winning for the candidates is a smooth function of their policy proposals and does not jump discontinuously as in the Downsian model. This leads politicians to not propose the median voter's preferred policy, but to target certain influential voter groups (the ones that are more moderate with respect to identity preferences).

Problem 2

Predictions from the income-based model of redistributive preferences have turned out to not always be true empirically. This has led scholars to come up with alternative or supplemental hypotheses about determinants of preferences for redistribution. Below is a list of different hypotheses about what determines the level of redistribution in society:

1. *Expected future income of the median voter*
2. *Reciprocal altruism and beliefs about the importance of luck vs effort*
3. *Racial heterogeneity*
4. *Information about inequality in society*
5. *Beliefs about intergenerational income mobility in society*

2A. Based on the readings from class, briefly describe each of the five alternative hypotheses listed above. Explain each hypothesis and how it can explain differences between the size of the welfare state in the U.S. and the size of the welfare state in Europe. You do not need to comment on whether there is empirical evidence in support of the hypothesis. *(Suggested length: 5-10 lines for each hypothesis)*

1: This hypothesis says that if the median voter expects to move up in the income distribution in the future, he/she might demand less redistribution compared to the case where preferences for redistribution are based only on current income. If the median voter's prospects of moving up in the income distribution are better in the U.S. than in Europe, this could explain the lower level of redistribution and smaller welfare state in the U.S.

2: The idea of reciprocal altruism in relation to welfare is that people are altruistic towards the poor only if they view them as deserving and hard-working, while they will be sceptical of redistribution if they view the poor as undeserving and lazy. There is evidence that people in the U.S. to a greater extent view the poor as lazy and believe that observed economic success and income differences are a result of hard work and effort. People in Europe, on the other hand, are more likely to view the poor as unfortunate and to believe that economic success is a result of luck. Hence, reciprocal altruism and beliefs about the role of luck vs effort might explain differences in redistribution between the U.S. and Europe.

3: This hypothesis builds on the idea that people might form in-group and out-group associations and prefer members of what they perceive as part of their own group. In relation to welfare, this means that people are reluctant to support redistribution to people who are not from their own group. Race might serve as a marker for in-group status. The demand for redistribution might therefore be lower in more (racially) diverse countries like the U.S. and higher in more homogenous countries like the European countries.

4: This hypothesis says that if an increase in inequality (from an increase in the gap between mean and median income) does not lead to an increased demand for redistribution, this might be due to lack of information about actual inequality and changes to inequality. Hence, greater misperceptions about inequality in the U.S., relative to Europe, might explain the low level of redistribution in the U.S.

5: This hypothesis says that demand for redistribution depends on fairness concerns and perceptions of equality of opportunity in society (rather than perceptions of equality of income and the median voter's position relative to the mean). In particular, the hypothesis says that if intergenerational income mobility is perceived as high, meaning that people have a high probability of moving from the bottom to the top of the income distribution, demand for redistribution is low. This, again, relates to beliefs about whether income differences are mostly due to luck or effort. If Americans perceive income mobility as high and Europeans perceive it as relatively low, this might explain the differences in demand for redistribution between the two places.

The paper by Kuziemko et al. (2015) in the American Economic Review is an example of a paper with an alternative theory (beyond the income-based model) of what might explain the demand for redistribution in society. Below are Table 4 and Table 5 from the paper showing some of the main results.

TABLE 4—EFFECT OF OMNIBUS TREATMENT ON OPINIONS ABOUT INEQUALITY
(*"First-Stage" outcomes*)

	Inequality very serious		Inequality increased		Rich deserving	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	0.102***	0.104***	0.119***	0.120***	−0.0500***	−0.0526***
	[0.0154]	[0.0144]	[0.0130]	[0.0128]	[0.0119]	[0.0114]
Control mean	0.285	0.285	0.738	0.738	0.180	0.180
Scaled effect	0.357	0.365	0.539	0.540	0.173	0.182
Covariates?	No	Yes	No	Yes	No	Yes
Observations	3,703	3,703	3,704	3,704	3,690	3,690

Notes: The three outcome variables are binary indicator variables, coded as one if the respondent says that "inequality is a very serious problem," "inequality has increased," and "the rich are deserving of their income," respectively. All regressions have round fixed effects, even those labeled as including "no" covariates. Controls for covariates further include all variables in the randomization table (Table 3), plus state-of-residence fixed effects. "Scaled effect" is the coefficient on *Treated* divided by the difference between control group liberals and conservatives. The row "Control mean" reports the mean of the outcome variable for the entire control group.

   ***Significant at the 1 percent level.
   **Significant at the 5 percent level.
   *Significant at the 10 percent level.

TABLE 5—EFFECT OF OMNIBUS TREATMENT ON POLICY PREFERENCES

	Top rate (1)	$1M tax (2)	Estate (3)	Petition (4)	Min. wage (5)	Trust (6)	Scope (7)	Dem 2012 (8)
Treated	0.931*	0.0502**	0.357***	0.0648***	0.0325**	−0.0292**	0.132***	0.0152
	[0.549]	[0.0126]	[0.0140]	[0.0156]	[0.0141]	[0.0115]	[0.0339]	[0.0125]
Control mean	30.21	0.740	0.171	0.234	0.690	0.158	3.076	0.529
Scaled effect	0.0914	0.111	2.043	0.394	0.0995	1.250	0.110	0.0246
Observations	3,741	3,704	3,673	3,060	3,690	3,702	3,704	3,703

Notes: "Top rate" is continuous (respondents' preferred average tax rate (in percent) on the richest 1 percent). "Scope" is also continuous (a 1–5 variable, increasing in the preferred scope of government activities). All other variables are binary. "$1M tax" and "Estate" indicate the respondent wants income taxes on millionaires and the estate tax to increase, respectively. "Petition" indicates she would write her Senator to increase the estate tax. "Min. wage" indicates support for increasing the minimum wage. "Trust" indicates trust in government and "Dem 2012" indicates the respondent plans to vote for the Democrat (Obama) in the 2012 presidential election. "Covariates" and "scaled effects" are as specified in the notes to Table 4. The row "Control mean" reports the mean of the outcome variable in the control group. All regressions in this and subsequent tables include control variables as defined in Table 4.

   ***Significant at the 1 percent level.
   **Significant at the 5 percent level.
   *Significant at the 10 percent level.

2B. Briefly explain the main hypothesis in Kuziemko et al. (AER, 2015) about determinants of demand for redistribution in the U.S. and explain the main experiment that they use to test this hypothesis. Explain what the results in table 4 and 5 from the paper (copied above) show. What are the main conclusions from the two tables? What do we learn from the results about determinants of redistribution in the U.S.? *(Suggested length: 10-15 lines)*

The main hypothesis of the paper is that misperceptions about inequality might explain why increases in inequality in the U.S. have not led to an increase in demand for redistribution. The main experiment that the authors use to test this is an RCT where they provide information about inequality. They test whether this has an effect on opinions and concerns about inequality and whether it affects policy preferences. Table 4 shows results for opinions and concerns about inequality. It shows that information about inequality increases people's concerns about inequality and decreases the propensity to think that the rich are deserving. Effect sizes are substantial; for instance, the information treatment increases respondents' propensity to say that inequality is a serious problem by 10 %-points. Table 5 shows the results for policy preferences. It shows that information about inequality affects policy preferences in the expected direction such that people become more supportive of redistribution (through, for instance, increases in the top-tax rate or increases in the minimum wage). The estimated effects, however, are small for all policies except for

the estate tax. We learn from these results that while information about inequality increases people's concerns about inequality, it does not move preferences for redistributive policies very much.

2C. The authors hypothesize that trust in government might matter for their results. Explain their hypothesis about trust in government. In particular, how might trust in government explain what they find in Table 4 and 5? Looking at the results in Table 9 from the paper (copied below), what do you conclude about the importance of trust in government for how people form preferences for redistribution? *(Suggested length: 5-10 lines)*

TABLE 9—EFFECT OF NEGATIVE TRUST PRIME ON OUTCOME VARIABLES

	$1M tax (1)	Estate tax (2)	Petition (3)	Min. wage (4)	Aid poor (5)	Food stamps (6)	Housing (7)	Private charity (8)
Treated	−0.0421 [0.0275]	−0.00168 [0.0266]	−0.0602* [0.0236]	−0.00428 [0.0902]	−0.139** [0.0616]	−0.153** [0.0673]	−0.163*** [0.0614]	0.187** [0.0791]
Control mean	0.722	0.204	0.174	2.673	2.675	2.454	2.581	1.800
Scaled trust effect	0.0949	0.00728	0.580	0.00531	0.128	0.119	0.133	0.169
Observations	899	895	899	899	899	899	899	850

Notes: The negative trust prime treatment consists of several multiple-choice questions that made respondents reflect on aspects of government they dislike. Outcome variables are defined as follows. "Min. wage" is a 0–4 categorical variable increasing in support for the minimum wage (0 indicates most opposition and 4 indicates most support). "Food stamps" is a 0–4 categorical variable increasing in support for food stamps. "Aid poor" is a 0–4 categorical variable increasing in support for programs that aid poor households. "Housing" is a 0–4 categorical variable increasing in support for funding public housing programs. "Private charity" is an indicator of where (among a list of five policy approaches) the respondent puts "private charity" as a preferred method for addressing inequality (the variable increases with relative support for private charity). All other outcomes are as defined previously.
　***Significant at the 1 percent level.
　**Significant at the 5 percent level.
　*Significant at the 10 percent level.

The hypothesis about trust in government says that if people have low trust in government, they might become more concerned about inequality following the information treatment, but they might not believe that government policy is the right way to address inequality and might therefore not change their support for redistribution. Table 9 shows the results from an experiment with a treatment priming respondent to have low trust in government. The table shows that low trust in government makes people less supportive of government policies to address inequality, confirming the hypothesis that low trust in government might weaken the link between inequality and demand for redistribution.

2D. Social media (like Facebook, Twitter, etc.) is an increasingly important source of information for many people. Some argue that this leads voters to consume more news and information that is targeted towards them and is politically biased, and that this might increase political polarization. Imagine that there is a new law saying that all information shown on social media must be the same for everyone and must be only true facts. Imagine as well that people using social media vary fundamentally with respect to their trust in government and that this is something that cannot be changed. Looking at the results from Kuziemko et al. (AER, 2015) and related studies that we covered in class, would you expect this law to eliminate polarization over political issues such as the level of redistribution? Are there reasons to believe that the same information might have different political effects on different people, and why? *(Suggested length: 5-10 lines)*

Results from Kuziemko et al. (AER, 2015) showed that information and increased concerns about inequality may not lead to increased support for redistribution because of low trust in government. This suggests that the same information about rising inequality might make everyone more concerned about inequality, but might lead someone who has high trust in government to *increase* their support for redistributive policies, while someone with low trust in government might *decrease* their support for redistributive policies. Hence, the same information can potentially lead to increased political polarization (i.e., increasingly opposing views) depending on variation in views on government. We also saw this in Alesina et al. (AER, 2018), that we covered in class, where an update in perceptions about income mobility had different effects on people's policy preferences

depending on their political (right/left) identity. Such a law on social media, ensuring that everyone gets the same correct information, might therefore not eliminate political polarization.

Problem 3

The imaginary country of Sweconomica is concerned about the low representation of women in politics. They have therefore decided to make female representation in positions as head of local government mandatory in a number of municipalities. They are trying to figure out how to pick the places with mandated female representation. As a scholar of political economics, you are interested in using this mandate policy to investigate the effect of female representation in politics on the level of government spending on public schools. To be able to get a causal estimate of the effect, you want to use Regression Discontinuity Design (RDD). The lawmakers of Sweconomica present three proposals to you for how they might design the policy. In particular, each proposal is an idea for how to pick the municipalities that will be required to have female heads of local government.

3A. For each of the policy proposals below, explain why this would or would not be a good design in order for you to be able to do a valid RDD after the policy has been implemented. Pick one policy that you would recommend to the lawmakers, which would enable you to do your study and get a causal estimate of female representation in politics on public school spending. *(Suggested length: 5-10 lines for each proposal)*

Proposal 1: All municipalities that never had a female head of local government must now adopt the policy of mandated female representation.

Proposal 2: All municipalities with more than 12,000 women residing in the municipality last year must now adopt the policy of mandated female representation.

Proposal 3: All municipalities where a hospital or a university is located must now adopt the policy of mandated female representation.

Proposal 1: This is not a good design for an RDD. The running or score variable is binary and not continuous (whether there was previously a female head of local government), and the estimate of the effect of mandated representation would come from comparing the group of municipalities that never had a female head to the group of municipalities that at least once had a female head. Previously having a female head is likely to be correlated with factors that also matter for policy outcomes, which will bias the estimate of the effect of mandated female leadership on policy outcomes (public school spending). We lack a continuous score variable with this setup, and hence do not have two comparable groups (right above and right below the treatment cut-off, respectively) to estimate a causal effect.

Proposal 2: This is a good design for an RDD. The running or score variable is number of female residents last year and is hence continuous. The number of female residents in general is most likely not random. Municipalities with many residents overall or municipalities where many women have chosen to live are different from municipalities with few residents or few women, with respect to various characteristics that might affect policy outcomes. However, in a narrow window around the treatment cut-off of 12,000 female residents last year, it is reasonable to assume that municipalities have essentially the same probability of being just above or just below the cut-off. There is most likely a random element to the number of female residents, and there is hence imperfect sorting into treatment. Therefore, comparing groups above and below the treatment cut-off in a sufficiently small window around the cut-off, is likely to provide a causal estimate of the effect.

Proposal 3: This is not a good design for an RDD. The running variable is again binary (whether a hospital or university is located in the municipality) and the effect is estimated by comparing the group of municipalities which have a hospital or university to those that do not. Since having a hospital or university is likely to be correlated with other characteristics (such as population and

composition of the population with respect to age, education, etc.) which might also be correlated with policy outcomes, the estimate from comparing these two groups is likely to be biased.

3B. Lawmakers in Sweconomica appreciate your inputs, but they come up with a fourth method for how to pick the municipalities with mandated female representation, which they decide to use. They decide that all municipalities with a geographical area of more than 350 km², are now required to have a female head of local government. Given this design of the mandate policy, describe how you would carry out your RDD study to find the effect of a female head of local government on public school spending. Assume that you have data on anything that you would need for your study. Also, explain what analyses you would do to convince readers of your study that your empirical design (the RDD) is valid. *(Suggested length: 10-15 lines)*

Let V_i be the geographical area in km² for each municipality i. V is the running or score variable in the analysis. Define a dummy variable D_i where $D_i = 1$ if $V_i > 350$. D is an indicator for whether the municipality is treated by the policy, i.e. whether the municipality is required to have a female head of local government. Let Y_i be government spending on public schools for each municipality in the period after the mandate policy has been implemented. Y is the outcome of interest. The RDD estimate of the effect of mandated female leadership on public school spending comes from comparing municipalities with a geographical area just above and just below, respectively, the treatment cut-off of 350 km². This can be done in a few different ways (students only need to mention one of them).

- Graphical analysis: Plot public school spending after the mandate policy has been implemented as a function of municipality geographical area, $E[Y|V]$, and measure the discontinuous jump at $V = 350$ to get the effect.
- Limit the sample of municipalities to municipalities with a geographical area within the interval $[350 - \delta; 350 + \delta]$ where δ is a small number. Then, on this sample, estimate the difference in means between the group of municipalities with $V \leq 350$ and the group of municipalities with $V > 350$ which is the estimated effect.
- Estimate the regression $Y = \beta_0 + \beta_1 D + g(V) + \varepsilon$ where $g(V)$ is a flexible smooth function of V. β_1 is the estimated effect of interest.

To convince readers that your RDD study is valid, you could compare predetermined characteristics (i.e., from before the mandate policy) for municipalities right above and right below the 350 km² threshold. Let X be a predetermined characteristic. The validity test can be carried out by replacing Y with X in one of the three approaches described above. For the RDD to be valid, there should be no discontinuous jump in predetermined characteristics around the treatment threshold of 350 km². The predetermined characteristics should be measured before the mandate policy was announced and implemented and could be, for instance, local government spending on public schools, total government spending, average age in the municipality, or share of households with school-aged children.

3C. Assume that you carry out your study and find that a female head of local government leads to more spending on public schools. Assume also that you do a survey on voter policy preferences and find that women, relative to men, on average care more about school policy and have a higher demand for spending on public schools. Do results from you RDD study support the idea that voters elect policies or the idea that voters affect policies at elections? If the lawmakers of Sweconomica ask you whether there are any reasons for them to care about underrepresentation of certain groups in politics, what would you tell them based on the results from your study? *(Suggested length: 10-15 lines)*

Results from the RDD support the idea that voters elect policies at elections. In models we covered in class where politicians can commit to a pre-election platform, there is full convergence to the

median voter's preferred policy (even if politicians themselves also care about policy). In that setup, voters *affect* policies, and it does not matter for policy who is in office. If, on the other hand, politicians cannot commit to a policy platform ahead of elections and they care about policy, it does not matter what they propose, as voters know that they will ultimately implement their own preferred policy. In that setting, voters rather *elect* policies, as they choose between the preferred policies of the candidates running for office. Here, it does matter for policy who is in office. Because the RDD shows that identity (gender) of the head of government matters for policy outcomes, the results support the idea that voters elect policies at elections. You would tell lawmakers that they might care about underrepresentation of certain groups because, based on your study, it does matter for policy outcomes who is in office, and politicians of a certain identity seem to implement policies that are aligned with preferences of voters of that same identity (based on the survey described). This means that underrepresentation of certain groups in politics might matter for policy outcomes. Underrepresentation could come from different barriers to running for office, for instance costs of running, norms, eligibility rules, etc. This relates to the results in Chattopadhyay and Duflo (Econometrica, 2004) that we covered in class. (Students do not need to mention barriers to running for office and do not need to reference this paper).