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Leveraging the Power of Regression Discontinuity Designs for Program Evaluation: An Institutional Simulation using R

Key Terms and R-Code

RDD Component/Definitions:

- **RDD –** Regression Discontinuity Design(s); a quasi-experimental technique employed to estimate the effects of randomized control trials (RCTs)
- **Forcing/Rating Variable** – numeric variable used to determine treatment per a certain score or "cut-point"
- **Sharp Design** – RDD where all subjects receive their assigned/intended treatment
- **Non-Parametric** – Local linear regression approach that estimates a local average treatment effect (LATE)
- **Program Theory** – underlying mechanism(s) by which a program (or service) is intended to bring about some desired result
- **Discontinuity** – the gap that may exist at the cut-point between the estimated regression line for the control group and the estimated regression line for the treatment group
- **Local Randomization** – assumed or determined randomization near the cut-point
- **Bandwidth** – in local linear regression with a rectangular kernel, the range of points on each side of the cut-point that will be included in the regression
- **Sensitivity Check** – determines how stable the LATE is across bandwidths—some variation is ok
- **McCrary Test** – formal empirical density test that assess whether the discontinuity in the rating density at the cut-point is equal to zero

R Component/Code:

- **Get Package** – install.packages("rddtools")
- **Load it** – require(rddtools)
- **Specify dataset as RDD ready** – CAIR_RDD_data<- rdd_data(y=CAIRdata$Sem_Point,x=CAIRdata$GPA,cutpoint = 2.5)
- **Compute Bandwidth** – bandwidthsize <- rdd_bw_ik(CAIR_RDD_data)
- **Specify Model** – CAIR_Model <- rdd_reg_np(rdd_object = CAIR_RDD_data, bw = bw_ik) # Specifiying Non-Parametric Model
- **Discontinuity Plot** – plot(CAIR_Model)
- **Obtain Output from Analysis** – summary(CAIR_Model)
- **McCrary Test** – dens_test(CAIR_Model)