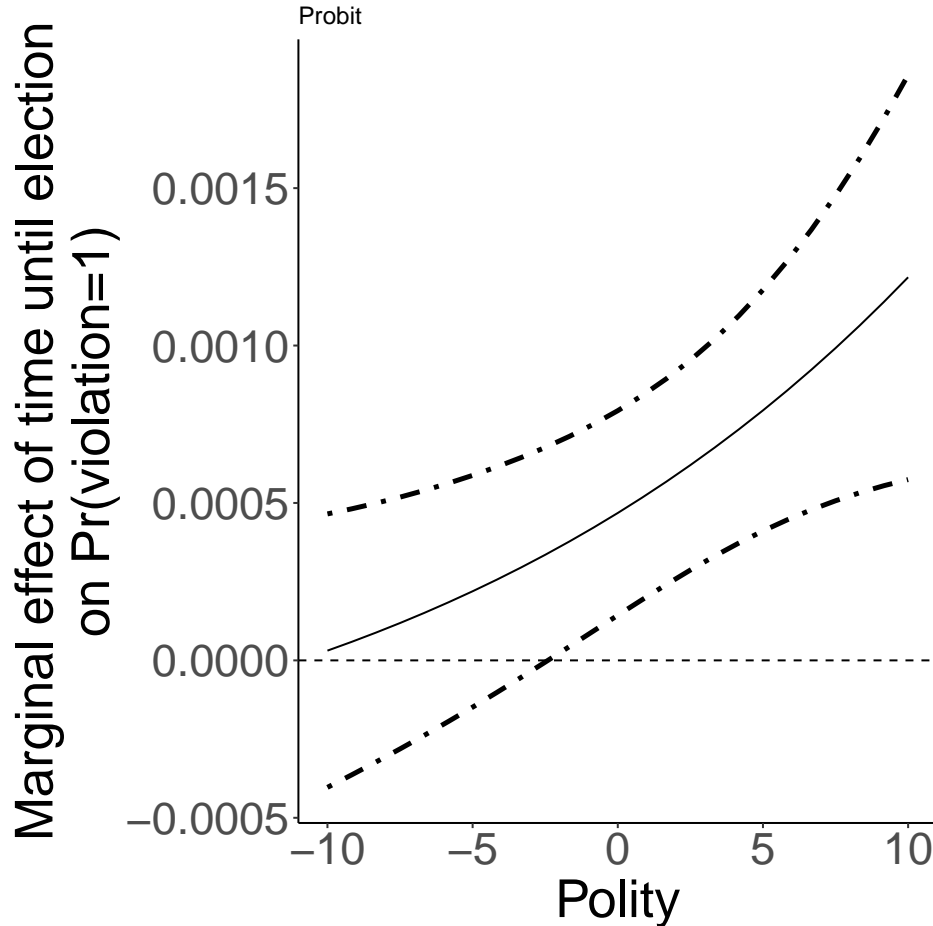# QRM Homework 3
GLM extentions with interactions replication
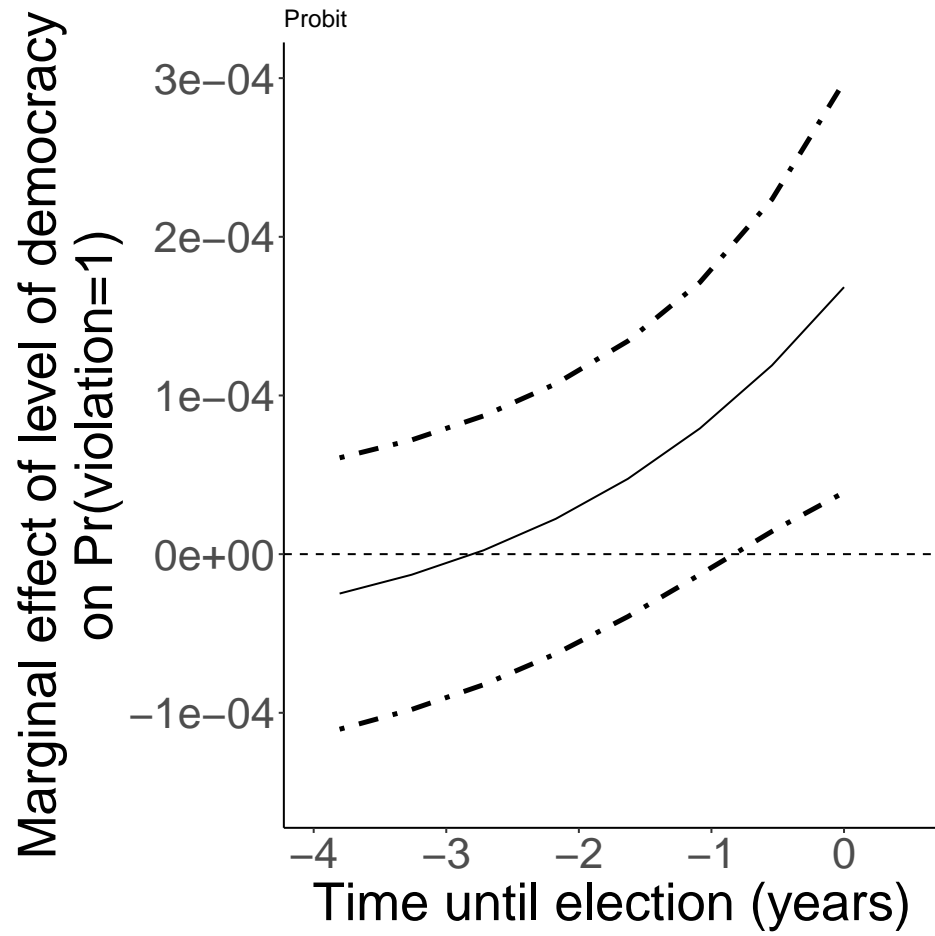
Alkan Can Mollaibrahimoğlu
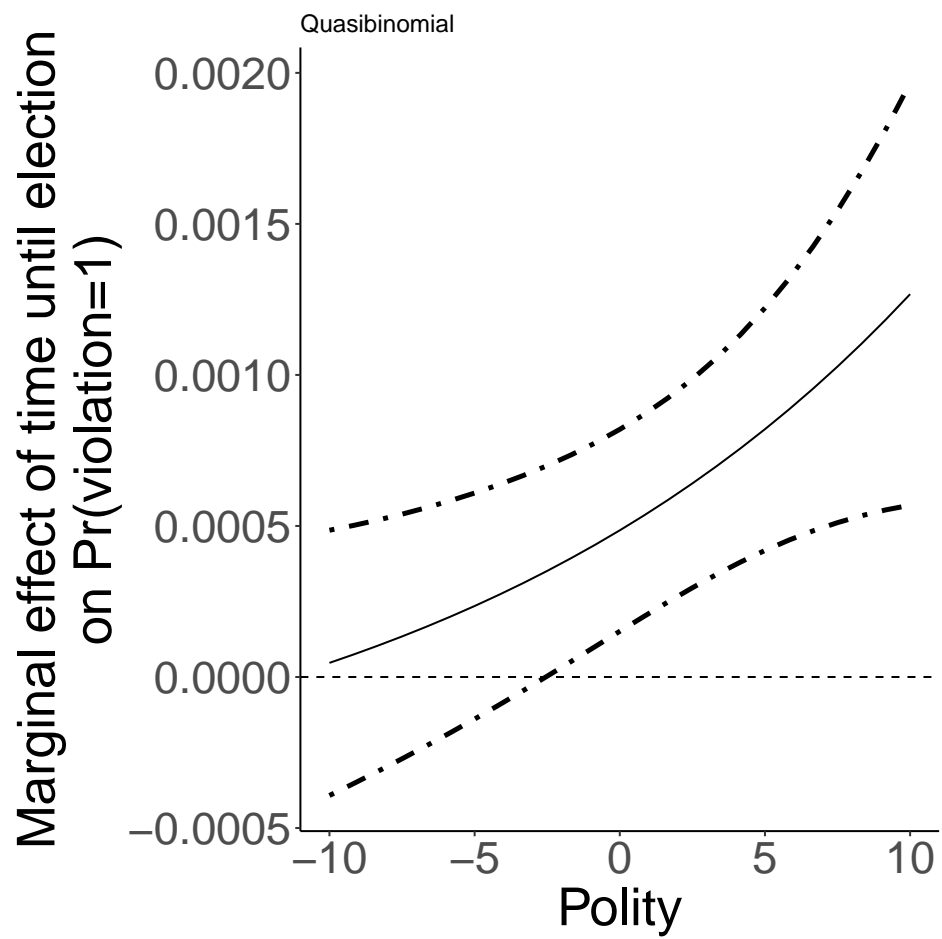Işık Topçu

April 20, 2022

1 Method

In *The Role of Democratic Governance and Indirect Expropriation in International Investment Treaty Violations*, Carlson and Ziegler argue that the relationship between *polity2* (level of democracy) and the treaty violations (*allViolations*) depend on whether the elections (*timeUntilAnyElec*) are closer or not. So, we assume that the level of democracy and the election time are interacted. Meaning that we cannot assume one's effect on the outcome without the other. We can observe this marginal effect via marginal effect plots. If there is a positively skewed relationship in the marginal effects plots, we can conclude that the variables in question are in interaction with each other. We chose to apply two extentions, Probit and Quasi Binomial models to find out if they improved in terms of dispersion. Both model's coefficients were similar to the logit.
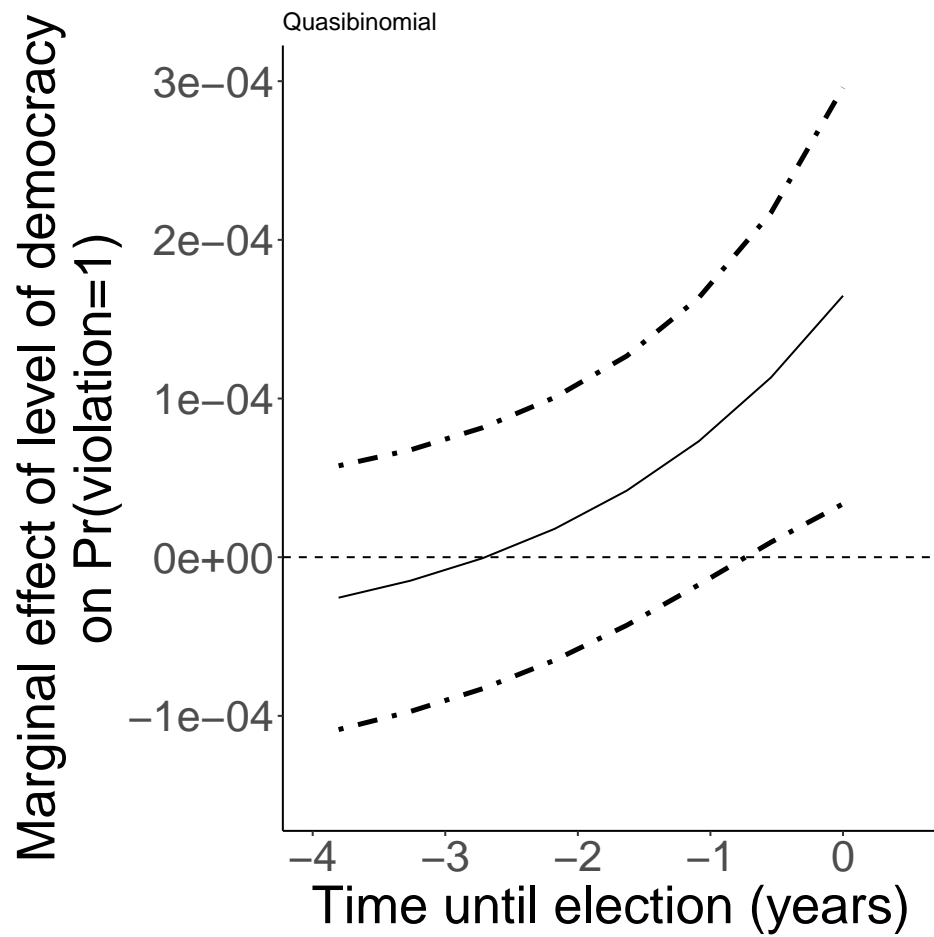
Plot 1: *Probit Marginal Effects Left Panel*

Plot 2: *Probit Marginal Effects Right Panel*

Plot 3: *Quasi Binomial Marginal Effects Left Panel*

Plot 4: *Quasi Binomial Marginal Effects Right Panel*

	Model 1
(Intercept)	−0.02
	(0.96)
polity2	0.02**
	(0.01)
timeUntilAnyElec	0.06**
	(0.02)
polconiii	−0.26
	(0.16)
log(NY.GDP.MKTP.CD)	−0.80**
	(0.29)
NY.GDP.MKTP.KD.ZG	0.01**
	(0.00)
NE.TRD.GNFS.ZS	−0.00*
	(0.00)
BX.KLT.DINV.WD.GD.ZS	0.00
	(0.00)
NY.GDP.TOTL.RT.ZS	0.00
	(0.00)
polity2:timeUntilAnyElec	0.01*
	(0.00)
AIC	2997.89
BIC	3090.30
Log Likelihood	−1488.94
Deviance	2977.89
Num. obs.	76160

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 1: Probit Model

	Model 1
(Intercept)	2.52
	(2.89)
polity2	0.05*
	(0.02)
timeUntilAnyElec	0.19**
	(0.06)
polconiii	−0.79
	(0.49)
log(NY.GDP.MKTP.CD)	−2.42**
	(0.89)
NY.GDP.MKTP.KD.ZG	0.02**
	(0.01)
NE.TRD.GNFS.ZS	−0.01*
	(0.00)
BX.KLT.DINV.WD.GD.ZS	0.00
	(0.01)
NY.GDP.TOTL.RT.ZS	0.01
	(0.01)
polity2:timeUntilAnyElec	0.02*
	(0.01)
AIC	
BIC	
Log Likelihood	
Deviance	2979.66
Num. obs.	76160

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 2: Quasi Binomial Model