Droughts, Land Appropriation, and Rebel Violence in The Developing World*

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Split Popn Cox Overrep Failure

Likelihood function

Recall from Ben's "Parametric Zombie Survival Model" that the probability of misclassification (that is, subset of non-censured failure outcomes that are being misclassified) is

$$\alpha = \Pr(C_i = 1|\widetilde{C}_i = 0) \tag{1}$$

The unconditional density is thus given by the combination of an observation's misclassification probability and its probability of experiencing an actual failure conditional on not being misclassified,

$$\alpha_i + (1 - \alpha_i) * f(t_i) \tag{2}$$

And the unconditional survival function is therefore

$$(1 - \alpha_i) * S(t_i) \tag{3}$$

where

$$\alpha_i = \frac{\exp(\mathbf{Z}\gamma)}{1 + \exp(\mathbf{Z}\gamma)} \tag{4}$$

The likeihood function of the Parametric Zombie Survival Model is from equation 7 in Ben's document is defined as

$$L = \prod_{i=1}^{N} [\alpha_i + (1 - \alpha_i) f(t_i|X, \beta)]^{C_i} [(1 - \alpha_i) S(t_i|\mathbf{X}, \beta)]^{1 - C_i} \tag{5}$$

And the log likelihood is

$$L = \sum_{i=1}^{N} \{C_i \ln[\alpha_i + (1 - \alpha_i) f(t_i|X, \beta)] + (1 - C_i) \ln[(1 - \alpha_i) S(t_i|\mathbf{X}, \beta)] \tag{6}$$

We extend these definitions and notation from the Parametric Zombie Survival Model to the Cox PH framework. To this end, first note that the conditional hazard function in the Cox PH model in this case is

$$h(t|\mathbf{X}) = h_0(t)e^{\mathbf{X}\beta} \tag{7}$$

where $h_0(t)$ is the unknown baseline hazard hazard function. Using equation (4), the description of