Homework #2

Professor: Pat Kline

Students: Christina Brown, Sam Leone, Peter McCrory, Preston Mui

3. Matlab Probit DGP

a) (Matlab program attached)

b) The ML point estimates of $\hat{\beta}^{con} = (\hat{\alpha}, \hat{b})$ are $(-0.0175, 0.9159)$. The standard errors are $(0.0918, 0.1301)$.

c) Score test: Regressing the restricted model's generalized residuals, given by

$$gres_i = \frac{Y_i \phi(X_i' \hat{\beta}^{con})}{\Phi(X_i' \hat{\beta}^{con})} - \frac{(1 - Y_i)\phi(X_i' \hat{\beta}^{con})}{1 - \Phi(X_i' \hat{\beta}^{con})}$$

on X_i^2 yields a coefficient of 0.0039 with a p-value of effectively 0, rejecting the null of 0.

d) The unrestricted model yields point estimates of $\hat{\beta}^{unc} = (\hat{\alpha}, \hat{b}, \hat{b_2}) = (-0.0435, 0.9175, 0.0428)$. The wald test, which tests $g(\beta) = 0$, where

$$g(\beta) \equiv (0, 0, 1) \cdot \beta = b_2$$
$$G(\beta) \equiv \frac{\partial g(\beta)}{\partial \beta} = (0, 0, 1)$$

and the Wald statistic is given by

$$N \cdot \hat{b_2} \cdot \left(G \cdot H^{-1} \cdot G' \right)^{-1} \cdot \hat{b_2}$$

where H is the average Hessian at the ML estimate. Here, the Wald evaluates to 0.3336, which has a p-value of 0.5636 under the χ^2 distribution with d.f. 1, much higher than the 0 obtained in part b.