negative binomial regression

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Negative binomial regression is a generalization of poisson regression. It removes the restriction of variance-mean equality. Similarly, the dependent variable follows the negative binomial distribution. Assume there are only 2 independent variables and we let x_1 be 0 and 1.

$$\begin{aligned} E[Y_i|x_i,\tau_i] &= \mu_i\tau_i \\ &= e^{x_i\beta+\epsilon_i} \\ E[Y_i|x_i,\tau_i] &= e^{x_1\beta_1+x_2\beta_2+\epsilon_1+\epsilon_2} \\ first\ diff\ &= e^{\beta_1+x_2\beta_2+\epsilon_1+\epsilon_2} - e^{x_2\beta_2+\epsilon_1+\epsilon_2} \end{aligned}$$

The τ_i is independent of the regressors. The introduction of τ_i is to generalize poisson regression.