Problem Set #1

MACS 30100, Dr. Evans
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1. Classify a model from a journal

(a) ∼ (b)

Fryer, Roland, G. Jr., and Steven D. Levitt. 2013. "Testing for Racial Differences in the Mental Ability of Young Children." *American Economic Review*, 103(2): 981-1005.

(c)

$$\theta_a = \alpha_a G + \beta_a E_a(\theta_m, \widetilde{E}_a) + \varepsilon_a, \tag{1}$$

where the measured test score of an individual at age a (θ_a) are influenced by an individual's genetic make-up (G), their environment (E_a) at age a, and a random error term (ε_a). The model assumes that the child's genetic endowment is fixed over time, but environmental factors being a function of the mother's test score, as well as factors $\widetilde{E}_a$ that are uncorrelated with the mother's test score.

(d)

Exogenous variable: Cognitive development (mental function composite score)

Endogenous variables: Demographics (age, gender), Home environment (parent education, parent occupation, family income, siblings, presence of a biological parent, mother's reaction towards child), Prenatal environment (birthweight, percent premature, multiple birth)

(e)

The model is static, linear, and stochastic because it assumes time-invariant linear relationship between exogenous variable and endogenous variables with a random error.

(f)

Although the model uses many different variables to explain child's mental ability, existence of a pet could be one variable that is missing. Owning a pet may be an important factor in home environment that could affect child's intelligence.

2. Make your own model

(a) ~ (c)

I used a probit model to estimate individual's binary decision of whether to ever get married.

$$P(y_i = 1|x_{1i}, x_{2i}, x_{3i}) = \Phi(\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \epsilon_i), \tag{2}$$

where dependent variable y_i equals 1 if individual ever got married, equals 0 if individual never got married, independent variables are x_{1i} = Affection between parent, x_{2i} = Unemployed, x_{3i} = Homosexuality, Φ is the cumulative distribution function of the standard normal distribution, and ε_a is a random error term. The parameters β_0 ~ β_3 are estimated by the maximum likelihood estimation.

(d) - (e)

I focused on why someone would never get married because it is more likely for human to get married at least once in their lifetime. There are two cases where individuals decide to remain single. One is that they decide to remain single because the expected benefit of marriage does not exceed the expected cost of giving up a single life. The net benefit would be negative for those who have bad impression about marriage, most likely to be formed by the bad relationship between their parent. Therefore, I believe affection between parent is a key factor driving one's decision to whether to ever get married. While there could be several ways to measure the affection between parent, I chose total hours parent spent together until one becomes age 20. Other case where individual would remain single is when they cannot get married due to financial or legal issues. Therefore, I used number of years unemployed during age 20 to 40 and homosexuality of an individual as a control variables for the model.

(f)

In order to test the model, I can randomly survey individuals that are older than 60. I would ask the average weekly hours that their parent spent together during their childhood, number of years that they were unemployed in their early career, sexual orientation, and whether they have ever got married. I can test if the model is good at explaining individual's decision of whether they have ever got married using the collected data.