

Problem Set #1

MACS 30100, Dr. Evans

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Problem 1 Classify a model from a journal

Part (b) This answer will introduce a study from American Economic Review. There is a phenomena in housing market that systematic above-trend increases in prices and transactions during the spring and summer("hot season") and below-trend falls during the autumn and winter("cold season"). The study tried to answer why informed buyers do not try to buy in the lower-price season. Therefore, they study proposed a model of search friction and "thick-market effect" and tested those hypothesis by empirical data.(Ngai and Tenreyro 2014).

Part (c) One of the main regression model is to test the hypothesis that the average quality of match formed in the summer is higher than in the winter. Since the quality of the match could not be observed, the author considered the following proxy as one of the test. The main idea is that the better the fit between buyer and the house, the longer the buyer will stay. The model is formulated as a Poisson regression:

$$\log Y_i = \beta * MovedInSummer_i + \gamma X_i + \alpha_i + \epsilon_i$$

Part (d) exogenous variable: main independent variable of concern: MovedIn-Summer, a dummy variable if the buyer moved into unit in the summer, X, is a vector of other control variables that influence the length of the stay 1) (log) year unit was built, 2) (log) family income, 3) number of persons in the household 4) number of adults 18+ in household 5) children in school dummy. α , fixed effects control: region, central city/suburban status, heating/cooling degree days, CMSA (Consolidated Metropolitan Statistical Area) **exogenous variable:** Y, the length of the stay.

Part (e) This is a static (because we do not actually have a time depended variable in the model), nonlinear(Although we could estimate Poisson by log transformation and maximum likelihood method, Poisson regression is a typical nonlinear regression), and stochastic model(the variable Y is also influenced by some random error).

Part (f) The model is well defined. One of the variable I could think of is the ratio of housing prices and income of the family, which is a good proxy for an indication of the sunk cost, which could help to explain the the length of stay, because the higher the sunk cost, the longer the may stay due to behaviour reason. One control that I think should be useful is the religion of the family. There might be religion difference in the housing market. For example, some religion might value more of the family value, therefore less likely to move.

Problem 2 Build your own model

Part a-c The original question is not clear, we do not know when whether someone decides to get married is that in 1 year, or 5 years or in his life, and we do not know who is going to decide, for example do we need to consider someone who is actually in marriage and decide to broke up and get married with someone else? To simplify our question, I shall restrict my question to whether a single man/woman decided to get married in one year time.

$$Y_i = \text{logit}^{-1}(\beta_0 + \beta_1 \text{status}_i + \beta_2 \text{income}_i + \beta_3 \text{age}_i + \beta_4 \text{education}_i \\ + \beta_5 \text{gender}_i + \beta_6 \text{race}_i + \beta_7 \text{nation}_i + \beta_8 \text{religion}_i + \epsilon_i)$$

Y_i is a dependent variable that be 1=get married or 0=not get married. logit^{-1} is the inverse logit function, status-relation status, a variable of the length in month of existing partner relationship(if none zero), ϵ_i is error term and distributed as independent identically normal distribution, other variables are quite intuitive, income-log income in terms of dollar of person, age-log age of the person, education-dummy of education of the person, gender-gender dummy of the person, race-race dummy of the person, nation-nationality of the person, religion- religion and belief the person.

Part d-e The main factors that influence this outcome should be status, age, income, education, gender and race. The first factor should be status, because current status should be a good predict for future marriage, it is reasonable to assume people have higher probability to get married if they are in a stable relation. Income also matters, because if people have low income, they might not able to afford a family or to raise children. Age is also an important indicator, because people usually get married at certain age, such as 30s or 40s. Education matters too, because people with low education level might less likely to get married. I choose those factors because they are intuitive more important than other variables that I did not choose.

Part f We could collect marriage data and conduct counter-factual analysis. We could collect data of age, income, education, gender, race, religion, nationality, and marriage time of time series. When we have this data-set, we could divided our data into training data, and testing data. We could use the training data to estimate our parameters and then using those parameters to predict the testing data to see if our model is predictive or not.

References

- ¹ L Rachel Ngai and Silvana Tenreyro. Hot and cold seasons in the housing market. *The American Economic Review*, 104(12):3991–4026, 2014.