Problem Set 1

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Problem 1

The model I am going to classify is from *Powering up China: Income Distributions and Residential Electricity Consumption* by Maximilian Auffhammer and Catherine D. Wolfram, *American Economic Review: Papers & Proceedings 2014, 104(5): 575580.*

The model about the number of energy-using appliances per household the paper specified is as follows:

$$\ln(\alpha/Diff_{it} - 1) = Inc_{it}\beta_1 + Ineq_{it}\beta_2 + \epsilon_{it}$$

where $Diff_{it}$ is the number of appliances per household in province i in year t; α is a constant set equal to 1 for refrigerators and washing machines and 2.5 for televisions and air conditioners; Inc_{it} is the average per capita consumption expenditure in province i in year t; $Ineq_{it}$ is the share of the population in province i in year t with incomes below 3,000 RMB per year; and ϵ_{it} is an error term.

Part (d).

Exogenous variables: $\alpha, \beta_1, \beta_2, \epsilon_{it}$

Endogenous variables: $Diff_{it}, Inc_{it}, Ineq_{it}$

Part (e).

This is a dynamic, nonlinear, and stochastic model. First, it captures time-dependent changes and requires panel data. Secondly, not all the operators on the left-hand side exhibit linearity. Thirdly, the model has an error term to capture fixed effects, so it is not deterministic.

Part (f).

In the aspect of public policy, the model may missing a variable stands for government allowance. Since 2007, in response to the global financial crisis, Chinese government launched a project called "home appliances going to the countryside", which aims to expand sales of household electric appliances in the country's vast rural areas at prices 13 percent lower than those in cities. Therefore, an extra variable represents the impact of this policy should also be taken into consideration.

Problem 2

$$Lifespan_i = \beta_0 + \beta_1 Child_i + \beta_2 Drug_i + \beta_3 Income_i + \beta_4 Album_i + \epsilon_i$$

where $Lifespan_i$ is the predicted lifespan (in year) of a particular musician i; $Child_i$ is a dummy indicating that whether the musician has a child; $Drug_i$ is also a dummy variable that indicates whether the musician has a history of drug use; $Income_i$ is the average annual income of the musician; $Album_i$ is the average number of albums the musician releases each year; and ϵ_i is an error term.

Part (c).

The simple model about the life expectancy of popular musicians is a complete DGP since given the coefficients and the constant term, through the model we can get the expected lifespan if we have the musician's child, drug, income, and release data, assuming the error terms have a normal distribution.

Part (d).

Among those variables, $Child_i$ and $Drug_i$ may be the key factors that influence the life expectancy of a popular musician.

Whether the musician has any children strongly influences the musician's lifespan because children will enhance the musician's sense of responsibility, not only for her family, but also for herself. The musician will also have a happier mood, healthier lifestyle, and a strong motivation to live longer with her kids. The use of drugs can be a key factor that has negative influence on the lifespan since besides damaging the musician's health, drugs also drain people's money and bring bad habits to life.

Part (e).

I think $Income_i$ does not have a very significant influence because lifespan may depend more on basic health care services, which do not cost an unaffordable price for most of the people, and beyond certain income level, more money cannot make people live significantly longer.

$Album_i$ basically represents how hard the musician works and probably how stressful the musician is, but the quantity of records is just one aspect. The workload and pressure the musician confronts also depends largely on the quality of their work, which is hard to measure. Therefore, the coefficient of this term may be insignificant.

Part (f).

Find a database online, which contains the lifespan, family, drug use, income, and works of popular musicians in history, or get them from Wikipedia. Then run OLS regression to test whether the independent variables are significant under some specified α level.