

Problem Set #1

MACS 30100, Dr. Evans

William L. Guzmán Daugherty

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Problem 1: Classify a model from a journal (5 points).

Part a: The model that the author presents is a linear IV model. The main objective is to offer an approach to estimating structural parameters in the presences of many instruments and controls based on methods for estimating sparse high-dimensional models.

Part b:

Victor Chernozhukov, Christian Hansen, and Martin Spindler. Post- selection and post-regularization inference in linear models with many controls and instruments. American Economic Review, 105(5):48690, May 2015.

Part c:

$$y_i = \alpha_0 d_i + x_i' \beta_0 + \epsilon_i \quad (1)$$

$$d_i = x_i' \gamma_0 + z_i' \delta_0 + u_i \quad (2)$$

After substituting the expression for z_i as a function of x_i into (2) and then into (1) we get a system that depends only on x_i :

$$y_i = x_i' \theta_0 + \rho_i^y, \quad (3)$$

$$d_i = x_i' \vartheta_0 + \rho_i^d, \quad (4)$$

Part d: In the empirical example of the model, a simple model of demand for automobiles,

$$P_{it} = z_{it}' \delta_0 + x_{it}' \gamma_0 + u_{it} \quad (5)$$

where P_{it} is price, the endogenous variable, and x_{it} are observed product characteristics compose of five variables: a constants, an air conditioning, horsepower divided by weight, miles per dollar, and vehicle size, the exogenous variables.

Part e: The model is a deterministic linear model. There is no variable that depends on time making it a static model.

Part f: In the exogenous variable I would add variables such as miles per year of the car, a binary variable answering if the car has been in an accident before, and the year the car was manufactured in.

Problem 2: Make your own model (5 points).

Part a: Using a simple linear regression model with six exogenous variables to predict the life expectancy of a musician.

$$Ple_i = b_0 + b_1 Gen + b_2 D + b_3 Instr + b_4 Cond + b_5 Age + b_6 Coun + \varepsilon_1 \quad (6)$$

Table 1: Variables	
Variables	Definition
Ple_i	Predicted Lifespan in Years
Gen	Genre
$Instr$	Instrument
$Cond$	Medical Condition
Age	Musicians Age
$Coun$	Birthplace

Part d: In my opinion, the age, birthplace and the usage of drugs will be the variables that will affect the outcome the most.

Part e: First I did a research on basic variables that affect life expectancy. After coming with different variables, I decided to ask friends which variables they think are the ones that affect these outcomes the most. The result was more than six variables, but to keep the model simple I only choose six.

Part f: The first step I will take to verify that my factors are significant in real life is to do a basic example. After that, I will continue doing more examples until I can find the simplest example. After finding the common

things among the different examples, I will do a simple regression with some basic data.