

Panel Data

Everyone has a **unique** data set of firms from the Czechoslovak voucher privatization. You have to explore and estimate demand function. You do not have to know much about the process itself, but anyway, a good description can be found in CERGE Working Paper no. 36 (J. Svejnar and M. Singer: "Using Vouchers to Privatize an Economy: The Czech and Slovak Case," also published in *Economics of Transition*, 1994, pp.43-64) or CERGE-EI WP no. 84 (J. Hanousek and E. Kroch: "The Two Waves of Voucher Privatization in the Czech Republic: A Model of Learning in Sequential Bidding"). Suppose, unlike Hanousek and Kroch, there is no problem in endogeneity of any variable.

Here is a guide for your work:

1) As usual, start by familiarizing with the data. Compute basic characteristics, report and briefly comment them.

2) Now create a panel (I already did this for you). Number of firms is the individual dimension (N), number of bidding rounds is the time one (T=6). Do not forget to have both identifiers for individuals and time.

3) Now specify your share demand model. Keep in mind that mostly you are not observing equilibria but demand for shares given the price no matter whether this demand could or could not be satisfied. You can look at the Svejnar-Singer paper for guidance but remember, they do not use the panel approach. Hanousek and Kroch use a model with learning, I do not recommend you to use this approach since then you could have more complex problem to solve. Suppose that all firm descriptive variables are exogenous (debt, profit,...) as well as all round specific variables in given round (note, that if you are using lagged variables such as demand of IPF in previous round, you have exogeneity problem). Remember, this exercise should give you a notion of the use of panel in an easy setup not in a complex one.

a) Explain why you need a panel to identify the demand curve.

b) Again, briefly discuss your choice of dependent variable and regressors. Does your choice of LHS affect the choice of regressors?

c) What functional form do you want to use? Suppose you have to estimate elasticity of share demand. Does this suggest a choice?

#### 4) Pooled regression

a) Run OLS on the pooled data and report the results in the table. What is the assumption about the error process?

b) Test for (chapter in the second edition of Greene is the reference noted):

i) Cross-sectional heteroskedasticity (16.3.1)

ii) Cross-sectional correlation (16.3.2)

iii) Serial correlation over rounds (16.3.3)

c) Run the FGLS on the basis of the tests in b) and add these results to the table done in part a).

#### 5) Panel regression

a) Estimate the fixed effect model and test for equality of constant terms across the firms (i.e. test for the relevance of LSDV versus pooled OLS).

b) Estimate the random effect model. Test the hypothesis that the classical model without common effect applies (Lagrange multiplier test).

c) Carry out the Hausman's test for random versus fixed effect model.

d) Are the two industries you are using the same? (Specify what economists mean by being "the same" in this case and carry out the tests)

Report the results in a suitable form.

6) Model assessment: Decide on your selection of the model and interpret your results in economic terms. What the variance components tell you about the determinants of share demand? Is the price elasticity of share demand (within an error) the same across firms?

Recommendation: Describe any tests and procedures in sufficient detail (however, in applied work nobody is interested in a computer program) to get at least partial credit for the tasks you are not able to finish or to obtain a correct result.

Data Description:

Overall statistics for the firm:

|            |   |
|------------|---|
| NUM        | Identifier of the firm  |
| TNS        | Total number of shares of the firm                                  |
| TNSVP      | Total number of shares of the firm allocated for the voucher scheme |
| NABA       | Net book assets (in 1000 crowns)                                    |
| GABA       | gross book assets (in 1000 crowns)                                  |
| LIAB       | Liabilities (in 1000 crowns)  |
| E89... E91 | Number of employees in year 89...91                                 |
| P89... P91 | Profit in year 89...91 (1000 crowns)                                |
| I89... I91 | Income (revenues) in year 89...91 (1000 crowns)                     |
| D89... D91 | Debt in year 89...91 (1000 crowns)                                  |

Variables adjusted in each round

|       |   |
|-------|---|
| RND   | Round indicator (time index of the panel)                         |
| NS    | Total number of shares offered in a given round                   |
| PR    | Price per share set in a given round                              |
| TB    | Total bid for shares in a given round (100 points)                |
| TBI   | Total bid for shares in a given round by individuals (100 points) |
| PX    | Total number of points exchanged in a given round                 |
| SALES | Total number of shares sold in a given round                      |

Share allocation variables

|        |  |
|--------|--|
| FOR    | % for direct sale to predetermined foreign owner(s)                      |
| DOM    | % for direct sale to predetermined domestic owner(s)                     |
| FNPT   | % for transfer to Fund of National Property for a limited time period    |
| FNPU   | % for transfer to Fund of National Property for an unlimited time period |
| RESTIT | % for restitutes   |
| INTERM | % for an intermediary (usually banks)                                    |

Industry codes (MIND, also first digit of IND):

|   |                                       |
|---|---------------------------------------|
| 1 | Agriculture                           |
| 2 | Heavy industry and mining             |
| 3 | Light industry                        |
| 4 | Construction                          |
| 5 | Transportation and telecommunications |
| 6 | Trade                                 |
| 7 | R & D                                 |
| 8 | Services, culture and education       |
| 9 | Financial and state institutions      |

Region codes (first two digits of REGION)

|    |                         |    |                          |
|----|-------------------------|----|--------------------------|
| 31 | Prague                  | 37 | South Moravian Region    |
| 32 | Central Bohemian Region | 38 | North Moravian Region    |
| 33 | South Bohemian Region   | 51 | Bratislava               |
| 34 | West Bohemian Region    | 52 | West Slovakian Region    |
| 35 | North Bohemian Region   | 53 | Central Slovakian Region |
| 36 | East Bohemian Region    | 54 | East Slovakian Region    |