Weiterführende Fragen der Ökonometrie

Übungsaufgaben – Blatt 11

Aufgabe 1

In Example 16.4 in Wooldridge (2009) the data set `openness.txt` is used to analyse whether more "open" countries have lower inflation rates. Therefore, a two equation system

$$inf = \beta_{10} + \alpha_1 open + \beta_{11} log(pcinc) + u_1 \quad (structural\, equation)$$

$$open = \beta_{20} + \beta_{21} log(pcinc) + \beta_{22} log(land) + u_2 \quad (reduced\, form)$$

has been used. However, since log(*pcinc*) is insignificant in both equations, we drop it from the further analysis.

(i) (2 Punkte) Reestimate the equations by OLS and IV without log(*pcinc*). Do any important conclusions change?

(ii) (2 Punkte) Still leaving log(*pcinc*) out of the analysis, is *land* or log(*land*) a better instrument for *open*? (*Hint*: Regress *open* on each of these separately and jointly.)

(iii) (1 Punkt) Now add the dummy variable *oil* to the equation and treat it as exogenous. Estimate the equation by IV. Does being an oil producer have a ceteris paribus effect on inflation?

Quelle: Wooldridge 3e & 4e Computer Exercise C16.3

Aufgabe 2 (4 Punkte)

Gegeben seien die Angebotsgleichung $q_i = \alpha_1 p_i + \beta_1 z_{i1} + \tilde{u}_{i1}$ (6.1a) und die Nachfragegleichung $q_i = \alpha_2 p_i + \beta_2 z_{i2} + \tilde{u}_{i2}$ (6.1b) aus dem Skript auf S. 178. Zur Schätzung der Angebotsgleichung wurden diese zu $q_i - \alpha_1 p_i = \beta_1 z_{i1} + \tilde{u}_{i1}$ und $-\frac{1}{\alpha_2} q_i + p_i = \frac{\beta_2}{\alpha_2} z_{i2} - \frac{1}{\alpha_2} \tilde{u}_{i2}$ umgeformt. Die strukturellen Gleichungen ließen sich dann schreiben als

$$(q_i \;\; p_i) \underbrace{\begin{pmatrix} 1 & \frac{-1}{\alpha_2} \\ -\alpha_1 & 1 \end{pmatrix}}_{\mathbf{A}_A} = (z_{i1} \;\; z_{i2}) \underbrace{\begin{pmatrix} \beta_1 & 0 \\ 0 & \frac{-\beta_2}{\alpha_2} \end{pmatrix}}_{\mathbf{B}_A} + (\tilde{u}_{i1} \;\; \tilde{u}_{i2}) \underbrace{\begin{pmatrix} 1 & 0 \\ 0 & \frac{-1}{\alpha_2} \end{pmatrix}}_{\mathbf{C}_A}$$

und (falls $\alpha_1 \neq \alpha_2$) die reduzierte Form als

$$(q_i \;\; p_i) = \mathbf{z}_i \underbrace{\mathbf{B}_A \mathbf{A}_A^{-1}}_{\mathbf{\Pi}} + \tilde{\mathbf{u}}_i \underbrace{\mathbf{C}_A \mathbf{A}_A^{-1}}_{\mathbf{\Phi}}.$$

Leiten Sie $\mathbf{A}_N$, $\mathbf{B}_N$, $\mathbf{C}_N$ und die reduzierte Form analog für die Schätzung der Nachfragegleichung her und zeigen Sie, dass das Ergebnis für die reduzierte Form identisch ist.

Aufgabe 3

Gegeben sei das folgende simultane Gleichungssystem

$$\begin{aligned} y_1 &= \alpha_{12} y_2 + \alpha_{13} y_3 + \beta_{11} z_1 + u_1 \\ y_2 &= \alpha_{21} y_1 + \alpha_{23} y_3 + \beta_{21} z_1 + \beta_{22} z_2 + u_2, \\ y_3 &= \alpha_{32} y_2 + \beta_{31} z_1 + \beta_{32} z_2 + \beta_{33} z_3 + \beta_{34} z_4 + u_3. \end{aligned}$$

Dabei sollen die Variablen y_t, $t = 1, 2, 3$, als endogen und die Variablen z_h, $h = 1, \ldots, 4$, als exogen angenommen werden.

(i) (2 Punkte) Bringen Sie alle endogenen Variablen auf eine Seite und bestimmen Sie analog zu Aufgabe 2 die Matrizen $\mathbf{A}$ und $\mathbf{B}$ und die strukturellen Gleichungen in Matrixschreibweise.

(ii) (1 Punkt) Was muss gelten, damit das Gleichungssystem in reduzierter Form existiert?

(iii) (2 Punkte) Leiten Sie die hinreichende Bedingung für die Identifikation der zweiten Gleichung in Abhängigkeit der Einträge π_{ij} der Matrix $\mathbf{\Pi} = \mathbf{B}\mathbf{A}^{-1}$ her. (Sie brauchen $\mathbf{B}\mathbf{A}^{-1}$ nicht explizit zu berechnen.)

Aufgabe 4

Use the data set in `fish.txt` which contains 97 daily price and quantity observations on fish prices at the Fulton Fish Market in New York City to estimate a demand function for fish.

(i) (2 Punkte) Assume that the demand equation can be written, in equilibrium for each time period, as

$$\log(totqty_t) = \alpha_1 \log(avgprc_t) + \beta_{10} + \beta_{11} mon_t + \beta_{12} tues_t + \beta_{13} wed_t + \beta_{14} thurs_t + u_{t1},$$

so that demand is allowed to differ across days of the week. Treating the price variable as endogenous, what additional information do we need to consistently estimate the demand equation?

(ii) (1 Punkt) The variables $wave2_t$ and $wave3_t$ are measures of ocean wave heights over the past several days. What two assumptions do we need to make in order to use $wave2_t$ and $wave3_t$ as IVs for $\log(avgprc_t)$ in estimating the demand equation?

(iii) (1 Punkt) Regress $\log(avgprc_t)$ on the day-of-the-week dummies and the two wave measures. Are $wave2_t$ and $wave3_t$ jointly significant? What is the p-value of the test?

(iv) (2 Punkte) Now, estimate the demand equation by 2SLS. What is the 95% confidence interval for the price elasticity of demand? Is the estimated elasticity reasonable?

(v) (2 Punkte) Obtain the 2SLS residuals, $\hat{u}_{t1}$. Add a single lag, $\hat{u}_{t-1,1}$ in estimating the demand equation by 2SLS. Remember, use $\hat{u}_{t-1,1}$ as its own istrument. Is there evidence of AR(1) serial correlation in the demand equation errors?

(vi) (1 Punkt) Given that the supply equation evidently depends on the wave variables, what two assumptions would we need to make in order to estimate the price elasticity of supply?

(vii) (1 Punkt) In the reduced form equation for $\log(avgprc_t)$, are the day-of-the-week dummies jointly significant? What do you conclude about being able to estimate the supply equation?

Quelle: Wooldridge 3e & 4e Computer Exercise C16.8