11.17 Example 11.3 introduces Klein's Model I.

a. Do we have an adequate number of IVs to estimate each equation? Check the necessary condition for the identification of each equation. The necessary condition for identification is that in a system of M equations at least $M - 1$ variables must be omitted from each equation.

$M=8 \Rightarrow M-1=7$ must be absent / 8개 − 8개 = 16

$CN_t = \alpha_1 + \alpha_2(W_{1t} + W_{2t}) + \alpha_3 P_t + \alpha_4 P_{t-1} + e_{1t}$ ⇒ 6개 variables ⇒ 16 − 6 = 10 variables are absent ⇒ identified

$I_t = \beta_1 + \beta_2 P_t + \beta_3 P_{t-1} + \beta_4 K_{t-1} + e_{2t}$ ⇒ 5 variables ⇒ 16 − 5 = 11 variables are absent ⇒ identified.

$W_{1t} = \gamma_1 + \gamma_2 E_t + \gamma_3 E_{t-1} + \gamma_4 TIME_t + e_{3t}$ ⇒ 5 variables ⇒ 16 − 5 = 11 variables are absent ⇒ identified.

b. An equivalent identification condition is that the number of excluded exogenous variables from the equation must be at least as large as the number of included right-hand side endogenous variables. Check that this condition is satisfied for each equation.

$CN_t = \alpha_1 + \alpha_2(W_{1t} + W_{2t}) + \alpha_3 P_t + \alpha_4 P_{t-1} + e_{1t}$ ⇒ 8 − 3 = 5 ≥ 2 ⇒ satisfied

$I_t = \beta_1 + \beta_2 P_t + \beta_3 P_{t-1} + \beta_4 K_{t-1} + e_{2t}$ ⇒ 8 − 3 = 5 ≥ 1 ⇒ satisfied

$W_{1t} = \gamma_1 + \gamma_2 E_t + \gamma_3 E_{t-1} + \gamma_4 TIME_t + e_{3t}$ ⇒ 8 − 3 = 5 ≥ 1 ⇒ satisfied.

c. Write down in econometric notation the first-stage equation, the reduced form, for W_{1t}, wages of workers earned in the private sector. Call the parameters $\pi_1, \pi_2, \ldots$

$W_{1t} = \pi_1 + \pi_2 G_t + \pi_3 W_{2t} + \pi_4 TX_t + \pi_5 TIME_t + \pi_6 P_{t-1} + \pi_7 K_{t-1} + \pi_8 E_{t-1} + v$

d. Describe the two regression steps of 2SLS estimation of the consumption function. This is not a question about a computer software command.

Step 1: Obtain fitted value $\hat{W}_{1t}$ and $\hat{P}_t$

Create $W_t^* = \hat{W}_{1t} + W_{2t}$

Step 2: Regress CN_t on W_t^*, $\hat{P}_t$ and P_{t-1}

e. Does following the steps in part (d) produce regression results that are identical to the 2SLS estimates provided by software specifically designed for 2SLS estimation? In particular, will the t-values be the same?

The coefficients must be the same. The t-value will not because the standard error in (d) are not correct 2SLS standard errors.