Project 2: Klein Model I

The work is based on data and a model first published in *Economic Fluctuations in the United States 1921-1941* by Lawrence R. Klein (1950). However you do NOT need to consult the book.

Background

Model I is the simplest of the 3 models in Klein’s book. This was pioneering work which combined the new Cowles Commission econometric methods to newish Keynesian macroeconomic models. Over the next decades the models became much bigger and more sophisticated. Klein collected a Nobel prize in 1980.

Model I is a crude Keynesian model in which all variables are expressed in real terms; there is no modelling of inflation and there is no monetary sector. The main objective is to understand the behaviour of income, $Y$, and the modelling effort concentrates on the components of aggregate demand, viz. consumption and investment. Together these determine aggregate output.

Non-standard features include the disaggregation of income into wages and profits. Klein expects consumption out of profit income to behave differently from consumption out of wage income and he also expects investment to depend on profits. Klein treats private sector wages as endogenous and has a labour market condition that describes how it is determined.

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Here “Klein Model I” means the following system of 8 equations. 3 are behavioural equations, which contain unknown parameters and error terms. The remaining 5 contain no error terms or unknown parameters; these equations are not estimated. They are a mixture of equilibrium conditions and accounting identities.

The variables are either current variables or are lagged once.

- **Consumption**: $C_0 = \alpha_0 + \alpha_1 \Pi + \alpha_2 \Pi_{-1} + \alpha_3 W + \varepsilon$
- **Investment**: $I = \beta_0 + \beta_1 \Pi + \beta_2 \Pi_{-1} + \beta_3 K_{-1} + \varepsilon$
- **Private Wages**: $W_1 = \gamma_0 + \gamma_1 X + \gamma_2 X_{-1} + \gamma_3 t + \varepsilon$
- **Income**: $Y = C_0 + I + G - T$
- **Profits**: $\Pi = Y - W_1 - W_2$
- **Capital Stock**: $K = K_{-1} + I$
- **Total Wages**: $W = W_1 + W_2$
- **Output**: $X = Y + T - W_2$

*Endogenous variables* (8 of them): the names appear before each equation in which they appear on the left hand side.

*Exogenous variables*: $G$ Government non-wage spending, $T$ indirect business taxes plus net exports, $W_2$ Government wage bill, $t$ time ($= 1, 2, 3, \ldots$). These and the lagged endogenous are the possible instruments.

*Note*: you may need to create some series such as $\Pi_{-1}$ and $t$.

**Tasks**

Examine the data graphically to see what Klein was trying to explain: choose some time plots and scatter plots to show what was happening in the US in the 1920s and -30s. Describe what you find. (On EViews the plots are on Quick/Graph.) Describe the correlograms for the important variables. (On EViews on Quick/Series Statistics.)

**SEM estimation**

(1) Estimate the three behavioural equations using least squares and 2SLS. Compare the estimates.
(2) Look at the 2SLS estimates: do the estimates have the right signs and are they significantly different from 0?

(3) Look at Resids and for each equation comment on how well the fitted values track the actual values.

**Time series methods.**

a) Take a few of the series (the ones you think most important) and fit a VAR to them. Experiment with different lag lengths and consult the Akaike AIC value. (Check the definition of this in the manual because it’s NOT the same as in my notes.) Comment on the fit and on the significance of the coefficients.

b) Is there any evidence of Granger causality?

c) Can any of the variables be modelled by a scalar AR process? If so, how well? Look at fit and tracking performance.

d) Perform impulse response analysis for the VAR (Accept EViews defaults.) Change the ordering of your variables and see if this makes any difference.

**Your report should contain**

- ALL the EViews output—tables and diagrams.
- A discussion covering the following points
  1. A description of the main features of the data so that we can understand what Klein and you are trying to do.
  3. A report of the time series analysis you have done and evaluate it.
  4. A summary of key findings and general comments.

Write NO MORE THAN 5 pages of text. Remember THIS IS NOT A DISSERTATION.