Macroeconometric Exam
15.07.2006

NAME.....

1. Describe how we test for the order of integration using the Dickey-Fuller test and how this procedure have to be adjusted to take into account the autocorrelation of error term and the trend in the time series.

2. Explain how we interpret the impulse response function and why their shape can depend on the way we identify the shocks.

3. Explain what are the conditional moment restrictions and how they can be replaced with unconditional moment restrictions - give an example of conditional moment restrictions based on economic theory.

For quarterly data for Poland following IS/LM model was constructed:

$$
\begin{aligned}
C_t &= \alpha_1 + \beta_1 Y_t + \varepsilon_{1t} \\
I_t &= \beta_0 + \beta_1 Y_t + \beta_3 r_t + \varepsilon_{2t} \\
r_t &= \phi_0 + \phi_1 Y_t + \phi_2 M_t + \varepsilon_{3t} \\
Y_t &= C_t + I_t + G_t + X_t
\end{aligned}
$$

where C_t - consumption, I_t - investment, r_t real interest rate, Y_t - Gross National Product (GDP), M_t money supply, G_t - government spendings, X_t trade balance. We assume, that M_t, G_t, X_t are exogenous.

Exercise 1 *All test should be done at significance level* $\alpha = 0.05$

1. *Consumption equation was estimated with standard OLS and following results were obtained:*

```
      Source |       SS       df       MS              Number of obs =      40
-------------+------------------------------           F(  1,    38) =  527.52
       Model |  3.2384e+10     1  3.2384e+10           Prob > F      =  0.0000
    Residual |  2.3328e+09    38  61388730.4           R-squared     =  0.9328
-------------+------------------------------           Adj R-squared =  0.9310
       Total |  3.4716e+10    39   890161222           Root MSE      =  7835.1

------------------------------------------------------------------------------
           C |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           Y |   .6297492   .0274189    22.97   0.000     .5742426    .6852559
       _cons |   380.6216   4594.334     0.08   0.934    -8920.121    9681.365
------------------------------------------------------------------------------
```

   Comment on the validity of using this method in this context.

2. *Following equation was estimated with OLS:*

```
      Source |       SS       df       MS              Number of obs =      40
-------------+------------------------------           F(  3,    36) = 1289.51
       Model |  3.4396e+10     3  1.1465e+10           Prob > F      =  0.0000
    Residual |   320085564    36  8891265.66           R-squared     =  0.9908
-------------+------------------------------           Adj R-squared =  0.9900
       Total |  3.4716e+10    39   890161222           Root MSE      =  2981.8

------------------------------------------------------------------------------
           C |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           G |   1.884434   .3778827     4.99   0.000     1.118052    2.650816
           M |   .1755955   .0315945     5.56   0.000      .111519     .239672
           X |   .3558973   .1448667     2.46   0.019     .0620941    .6497006
       _cons |   3843.933   3968.608     0.97   0.339    -4204.778    11892.64
------------------------------------------------------------------------------
```

$$C_t = \delta_0 + \delta_1 M_t + \delta_2 G_t + \delta_3 X_t + \xi_t$$

(a) *Comment on consistency of these estimates.*

(b) *What is the interpretation of parameters δ_1, δ_2, δ_3?*

(c) *What is the difference between this equation and the consumption equation in the structural model?*

3. *Consumption equation was estimated with $2SLS$ and following results were obtained:*

```
 Instrumental variables (2SLS) regression

      Source |       SS       df       MS              Number of obs =      40
-------------+------------------------------           F(  1,    38) =  534.77
       Model |  3.2323e+10     1  3.2323e+10           Prob > F      =  0.0000
    Residual |  2.3929e+09    38  62971388.4           R-squared     =  0.9311
-------------+------------------------------           Adj R-squared =  0.9293
       Total |  3.4716e+10    39   890161222           Root MSE      =  7935.5

------------------------------------------------------------------------------
           C |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           Y |   .6568881   .0284059    23.13   0.000     .5993834    .7143927
       _cons |  -3998.347   4752.045    -0.84   0.405    -13618.36    5621.665
------------------------------------------------------------------------------
Instrumented:  Y
Instruments:   G M X
------------------------------------------------------------------------------
```

(a) *What is the interpretation of the estimated parameters?*

(b) *Are the estimates agree with the Keynes theory that the proportion of the consumption in income (Average propensity to consume) falls with the rise of income?*

(c) *Under what extra assumptions $2SLS$ estimator is consistent?*

4. *The Sargan test was calculated for consumption and following result was obtained:*

```
Tests of overidentifying restrictions:
Sargan N*R-sq test       12.052  Chi-sq(2)    P-value = 0.0024
Basmann test             15.525  Chi-sq(2)    P-value = 0.0004
```

What does this results imply?

5. *The Hausman test was calculated for consumption and following result was obtained:*

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      MZI          MNK         Difference          S.E.
-------------+----------------------------------------------------------------
           Y |    .6568881     .6297492        .0271388        .0074227
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from ivreg
          B = inconsistent under Ha, efficient under Ho; obtained from regress

    Test:  Ho:  difference in coefficients not systematic

                  chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       13.37
                Prob>chi2 =      0.0003
```

What does this results imply?