Guideline Solution
Assignment 2

From the data set `assign2.dta`:

Demand and Supply Equations

$$\ln S_t = \beta_{10} + \beta_{11}\ln P_{Dt} + \beta_{12}\ln P_{X2t} + \beta_{13}\ln P_{X3t} + \beta_{14}\ln P_{X4t} + \varepsilon_{1t} \quad (1)$$

$$\ln D_t = \beta_{20} + \beta_{21}\ln P_{Dt} + \beta_{22}\ln GDP_t + \varepsilon_{2t} \quad (2)$$

Equilibrium condition can be achieved by $D_t = S_t$ through the price P_{Dt} mechanism.

where: S_t = Domestic Supply at time *t*

D_t = Domestic Demand at time *t*

P_{Dt} = Domestic Price at time t = $P_{Mt} + T_t$

T_t = Tariff at time *t*

P_{X2t} = Price of Input 2 at time *t*

P_{X3t} = Price of Input 3 at time *t*

P_{X4t} = Price of Input 4 at time *t*

GDP_t = Gross Domestic Product (Representing Income) at time *t*

Endogenous variables in this system include S_t, D_t, and P_{Dt}
Exogenous variables in this system include P_{X2t}, P_{X3t}, P_{X4t}, and GDP_t

a. State reduce form models of this system. Estimate reduce form models using OLS and prediction of the endogenous variables.

<u>Reduce form models</u>:

$$\ln S_t = \pi_{10} + \pi_{11}\ln P_{X2t} + \pi_{12}\ln P_{X3t} + \pi_{13}\ln P_{X4t} + \pi_{14}\ln GDP_t + w_{1t}$$
$$\ln D_t = \pi_{20} + \pi_{21}\ln P_{X2t} + \pi_{22}\ln P_{X3t} + \pi_{23}\ln P_{X4t} + \pi_{24}\ln GDP_t + w_{2t}$$
$$\ln P_{Dt} = \pi_{30} + \pi_{31}\ln P_{X2t} + \pi_{32}\ln P_{X3t} + \pi_{33}\ln P_{X4t} + \pi_{34}\ln GDP_t + w_{3t}$$

<u>*Set up STATA analysis as time-series analysis</u>

```
. tsset obs
        time variable:  obs, 1986 to 2007
                delta:  1 unit
```

<u>*Generate Variable in ln-form</u>

```
. g lnst=ln(st)

. g lndt=ln(dt)

. g pd=pm+t

. g lnpd=ln(pd)

. g lnpx2=ln(px2)

. g lnpx3=ln(px3)
```

```
. g lnpx4=ln(px4)

. g lngdp=ln(gdp)
```

***Estimate Reduced Form model for Supply model**

```
. reg lnst lnpx2 lnpx3 lnpx4 lngdp

      Source |       SS       df       MS              Number of obs =      22
-------------+------------------------------           F(  4,    17) =   37.32
       Model |  4.64569724     4  1.16142431           Prob > F      =  0.0000
    Residual |  .529104674    17  .031123804           R-squared     =  0.8978
-------------+------------------------------           Adj R-squared =  0.8737
       Total |  5.17480192    21  .246419139           Root MSE      =  .17642

------------------------------------------------------------------------------
        lnst |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lnpx2 |  -.4503744   .1515961    -2.97   0.009    -.7702142   -.1305347
       lnpx3 |  -.9242052   .2783356    -3.32   0.004    -1.511442   -.3369685
       lnpx4 |  -.3883793   .4222332    -0.92   0.371    -1.279214    .5024549
       lngdp |   .3438812   .1913463     1.80   0.090    -.0598242    .7475865
       _cons |   24.65741   5.309757     4.64   0.000      13.4548    35.86002
------------------------------------------------------------------------------
```

***Predict lnsthat for Supply model**

```
. predict lnsthat, xb
```

***Estimate Reduced Form model for Demand model**

```
. reg lndt lnpx2 lnpx3 lnpx4 lngdp

      Source |       SS       df       MS              Number of obs =      22
-------------+------------------------------           F(  4,    17) =   26.43
       Model |   3.4026552     4  .850663799           Prob > F      =  0.0000
    Residual |   .54721789    17  .032189288           R-squared     =  0.8615
-------------+------------------------------           Adj R-squared =  0.8289
       Total |  3.94987309    21  .188089195           Root MSE      =  .17941

------------------------------------------------------------------------------
        lndt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lnpx2 |  -.4887365   .1541691    -3.17   0.006    -.8140049   -.1634682
       lnpx3 |  -.7243134   .2830597    -2.56   0.020    -1.321517   -.1271097
       lnpx4 |   -.577921   .4293997    -1.35   0.196    -1.483875    .3280333
       lngdp |   .1265855    .194594     0.65   0.524    -.2839719    .5371429
       _cons |   27.18614   5.399879     5.03   0.000     15.79339    38.57889
------------------------------------------------------------------------------
```

***Predict lndthat for Supply model**

```
. predict lndthat, xb
```

***Estimate Reduced Form model for Domestic Price model**

```
. reg lnpd lnpx2 lnpx3 lnpx4 lngdp

      Source |       SS       df       MS              Number of obs =      22
-------------+------------------------------           F(  4,    17) =    6.76
       Model |   .17707359     4  .044268398           Prob > F      =  0.0019
    Residual |  .111247189    17  .006543952           R-squared     =  0.6142
-------------+------------------------------           Adj R-squared =  0.5234
       Total |  .288320779    21  .013729561           Root MSE      =  .08089

------------------------------------------------------------------------------
        lnpd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
       lnpx2 |   .1318015   .0695123     1.90   0.075    -.0148567    .2784596
       lnpx3 |   .0939842    .127627     0.74   0.472    -.1752851    .3632535
       lnpx4 |   .4939641   .1936093     2.55   0.021     .0854842    .9024439
       lngdp |   .1632779   .0877392     1.86   0.080    -.0218357    .3483914
       _cons |    2.87652   2.434717     1.18   0.254    -2.260283    8.013322
------------------------------------------------------------------------------
```

***Predict lnydhat for Domestic Price model**

```
. predict lnpdhat, xb
```

b. Estimate structural form using predicted endogenous variables as independent variables in the structural form models.

```
. reg lnst lnpdhat lnpx2 lnpx3 lnpx4

      Source |       SS       df       MS              Number of obs =      22
-------------+------------------------------           F(  4,    17) =   37.32
       Model |  4.64569773     4  1.16142443           Prob > F      =  0.0000
    Residual |  .529104183    17  .031123775           R-squared     =  0.8978
-------------+------------------------------           Adj R-squared =  0.8737
       Total |  5.17480192    21  .246419139           Root MSE      =  .17642

------------------------------------------------------------------------------
        lnst |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lnpdhat |   2.106112   1.171903     1.80   0.090    -.3663879    4.578612
       lnpx2 |   -.727963   .1840856    -3.95   0.001     -1.11635   -.3395762
       lnpx3 |  -1.122146   .2824139    -3.97   0.001    -1.717988   -.5263052
       lnpx4 |  -1.428722   .4751381    -3.01   0.008    -2.431176   -.4262679
       _cons |   18.59912   8.546622     2.18   0.044     .5673274    36.63092
------------------------------------------------------------------------------

. reg lndt lnpdhat lngdp

      Source |       SS       df       MS              Number of obs =      22
-------------+------------------------------           F(  2,    19) =   44.99
       Model |  3.26129847     2  1.63064924           Prob > F      =  0.0000
    Residual |  .688574614    19  .036240769           R-squared     =  0.8257
-------------+------------------------------           Adj R-squared =  0.8073
       Total |  3.94987309    21  .188089195           Root MSE      =  .19037

------------------------------------------------------------------------------
        lndt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lnpdhat |  -2.574157   .5697943    -4.52   0.000     -3.76675   -1.381563
       lngdp |   .5212927   .1344816     3.88   0.001     .2398194     .802766
       _cons |   35.93498   7.189835     5.00   0.000     20.88648    50.98347
------------------------------------------------------------------------------
```

***Alternative Command 2sls**

```
. ivregress 2sls lnst lnpx2 lnpx3 lnpx4 (lnpd= lnpx2 lnpx3 lnpx4 lngdp),  first

First-stage regressions
-----------------------

                                                Number of obs    =        22
                                                F(    4,     17) =      6.76
                                                Prob > F         =    0.0019
                                                R-squared        =    0.6142
                                                Adj R-squared    =    0.5234
                                                Root MSE         =    0.0809
```

```
------------------------------------------------------------------------------
        lnpd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lnpx2 |   .1318015   .0695123     1.90   0.075    -.0148567    .2784596
       lnpx3 |   .0939842    .127627     0.74   0.472    -.1752851    .3632535
       lnpx4 |   .4939641   .1936093     2.55   0.021     .0854842    .9024439
       lngdp |   .1632779   .0877392     1.86   0.080    -.0218357    .3483914
       _cons |    2.87652   2.434717     1.18   0.254    -2.260283    8.013322
------------------------------------------------------------------------------

Instrumental variables (2SLS) regression          Number of obs   =         22
                                                  Wald chi2(4)    =      55.22
                                                  Prob > chi2     =     0.0000
                                                  R-squared       =     0.6424
                                                  Root MSE        =     .29004

------------------------------------------------------------------------------
        lnst |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lnpd |    2.10611   1.926677     1.09   0.274    -1.670107    5.882327
       lnpx2 |  -.7279628   .3026471    -2.41   0.016     -1.32114   -.1347853
       lnpx3 |  -1.122146    .464304    -2.42   0.016    -2.032165    -.212127
       lnpx4 |  -1.428722   .7811544    -1.83   0.067    -2.959757    .1023125
       _cons |   18.59914   14.05113     1.32   0.186    -8.940569    46.13886
------------------------------------------------------------------------------
Instrumented:  lnpd
Instruments:   lnpx2 lnpx3 lnpx4 lngdp

. ivregress 2sls lndt lngdp (lnpd= lnpx2 lnpx3 lnpx4 lngdp)

Instrumental variables (2SLS) regression          Number of obs   =         22
                                                  Wald chi2(2)    =     178.41
                                                  Prob > chi2     =     0.0000
                                                  R-squared       =     0.8982
                                                  Root MSE        =      .1352

------------------------------------------------------------------------------
        lndt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lnpd |  -2.574157   .4046743    -6.36   0.000    -3.367304    -1.78101
       lngdp |   .5212921   .0955104     5.46   0.000     .3340951     .708489
       _cons |   35.93499   5.106302     7.04   0.000     25.92682    45.94316
------------------------------------------------------------------------------
Instrumented:  lnpd
Instruments:   lngdp lnpx2 lnpx3 lnpx4
```

c. Estimate this system equations model using OLS, 2SLS, 3SLS, and I3SLS. Determine whether there exists endogeneity bias in the estimated results. Concerning on the asymptotic property, which model is the most appropriated model? Why? What do β_{21} and β_{22} mean?

```
. reg3 (lnst lnpd lnpx2 lnpx3 lnpx4) (lndt lnpd lngdp), ols inst(lnpx2 lnpx3
lnpx4 lngdp)

Multivariate regression
----------------------------------------------------------------------
Equation          Obs  Parms        RMSE    "R-sq"      F-Stat        P
----------------------------------------------------------------------
lnst               22      4    .1652258    0.9103       43.14   0.0000
lndt               22      2    .1391259    0.9069       92.53   0.0000
----------------------------------------------------------------------

------------------------------------------------------------------------------
```

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnst						
lnpd	-1.111835	.4515147	-2.46	0.019	-2.027549	-.1961207
lnpx2	-.4189546	.1431634	-2.93	0.006	-.7093034	-.1286059
lnpx3	-.9424196	.2585266	-3.65	0.001	-1.466736	-.4181034
lnpx4	-.521346	.3441643	-1.51	0.139	-1.219344	.1766516
_cons	41.4946	3.661911	11.33	0.000	34.0679	48.9213
lndt						
lnpd	-2.181329	.2946999	-7.40	0.000	-2.779008	-1.58365
lngdp	.5776586	.0887536	6.51	0.000	.397658	.7576593
_cons	31.03578	3.761201	8.25	0.000	23.40771	38.66385

```
. reg3 (lnst lnpd lnpx2 lnpx3 lnpx4) (lndt lnpd lngdp), 2sls inst(lnpx2 lnpx3
lnpx4 lngdp)
```

Two-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
lnst	22	4	.329951	0.6424	10.67	0.0000
lndt	22	2	.1454858	0.8982	77.04	0.0000

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnst						
lnpd	2.10611	2.191774	0.96	0.343	-2.339013	6.551233
lnpx2	-.7279628	.3442892	-2.11	0.041	-1.426214	-.0297119
lnpx3	-1.122146	.528189	-2.12	0.041	-2.193363	-.0509293
lnpx4	-1.428722	.8886357	-1.61	0.117	-3.230959	.3735147
_cons	18.59914	15.98447	1.16	0.252	-13.81886	51.01715
lndt						
lnpd	-2.574157	.4354519	-5.91	0.000	-3.457295	-1.69102
lngdp	.5212921	.1027745	5.07	0.000	.3128558	.7297283
_cons	35.93499	5.494663	6.54	0.000	24.7913	47.07868

Endogenous variables: lnst lnpd lndt
Exogenous variables: lnpx2 lnpx3 lnpx4 lngdp

```
. reg3 (lnst lnpd lnpx2 lnpx3 lnpx4) (lndt lnpd lngdp), 3sls inst(lnpx2 lnpx3
lnpx4 lngdp)
```

Three-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
lnst	22	4	.2963642	0.6266	57.47	0.0000
lndt	22	2	.135203	0.8982	178.41	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnst						
lnpd	2.171576	1.926095	1.13	0.260	-1.603501	5.946652
lnpx2	-.7990055	.2985983	-2.68	0.007	-1.384247	-.2137635
lnpx3	-1.329743	.4560002	-2.92	0.004	-2.223487	-.4359989
lnpx4	-1.171403	.775654	-1.51	0.131	-2.691657	.348851
_cons	17.84948	14.04122	1.27	0.204	-9.670808	45.36976
lndt						

```
        lnpd |  -2.574157   .4046743    -6.36   0.000    -3.367304    -1.78101
       lngdp |   .5212921   .0955104     5.46   0.000     .3340951     .708489
       _cons |   35.93499   5.106302     7.04   0.000     25.92682    45.94316
------------------------------------------------------------------------------
Endogenous variables:  lnst lnpd lndt
Exogenous variables:   lnpx2 lnpx3 lnpx4 lngdp
------------------------------------------------------------------------------

. reg3 (lnst lnpd lnpx2 lnpx3 lnpx4) (lndt lnpd lngdp), 3sls ireg3 inst(lnpx2
lnpx3 lnpx4 lngdp)

Iteration 1:   tolerance =   .1059484
Iteration 2:   tolerance =  .04569793
Iteration 3:   tolerance =  .01846611
Iteration 4:   tolerance =  .00725496
Iteration 5:   tolerance =  .00281814
Iteration 6:   tolerance =  .00108981
Iteration 7:   tolerance =  .00042072
Iteration 8:   tolerance =  .00016231
Iteration 9:   tolerance =   .0000626
Iteration 10:   tolerance =  .00002414
Iteration 11:   tolerance =  9.310e-06
Iteration 12:   tolerance =  3.590e-06
Iteration 13:   tolerance =  1.384e-06
Iteration 14:   tolerance =  5.339e-07

Three-stage least-squares regression, iterated
----------------------------------------------------------------------
Equation          Obs  Parms        RMSE    "R-sq"       chi2        P
----------------------------------------------------------------------
lnst               22      4    .3022006    0.6117      54.83   0.0000
lndt               22      2     .135203    0.8982     178.41   0.0000
----------------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnst         |
        lnpd |   2.212666   2.005956     1.10   0.270    -1.718936    6.144268
       lnpx2 |  -.8435967   .3049354    -2.77   0.006    -1.441259   -.2459342
       lnpx3 |  -1.460044   .4623671    -3.16   0.002    -2.366267   -.5538216
       lnpx4 |  -1.009892   .7998393    -1.26   0.207    -2.577548     .557764
       _cons |   17.37893   14.61488     1.19   0.234    -11.26571    46.02357
-------------+----------------------------------------------------------------
lndt         |
        lnpd |  -2.574157   .4046743    -6.36   0.000    -3.367304    -1.78101
       lngdp |   .5212921   .0955104     5.46   0.000     .3340951     .708489
       _cons |   35.93499   5.106302     7.04   0.000     25.92682    45.94316
------------------------------------------------------------------------------
Endogenous variables:  lnst lnpd lndt
Exogenous variables:   lnpx2 lnpx3 lnpx4 lngdp
------------------------------------------------------------------------------
```

Concerning on the asymptotic property, 3SLS or I3SLS is the most appropriated model. Because if there exists correlation of the error terms across equations, 3SLS or I3SLS will lead to a more asymptotically efficient estimators.

However, if there exists specification error problem in any model(s), the specification error will spread throughout the whole system.

β_{21} represents price elasticity of quantity demand.
β_{22} represents income elasticity of quantity demand.

If equilibrium doesn't hold $D_t \neq S_t$, when $D_t > S_t$; then $Q_t = S_t$ but when $D_t < S_t$; then $Q_t = D_t$, where Q_t is transaction quantity at time *t*.

$$\ln Q_t = \beta_{10} + \beta_{11} \ln P_{Dt} + \beta_{12} \ln P_{X2t} + \beta_{13} \ln P_{X3t} + \beta_{14} \ln P_{X4t} + \varepsilon_{1t} \quad (3)$$

$$\ln Q_t = \beta_{20} + \beta_{21} \ln P_{Dt} + \beta_{22} \ln GDP_t + \varepsilon_{2t} \quad (4)$$

d. Generate lnQ_t and estimate the above system equations (model (3) and model (4)) using OLS, 2SLS, and 3SLS using Q_t, and P_{Dt} as endogenous variables and P_{X2t}, P_{X3t}, P_{X4t}, and GDP_t as exogenous variables.

```
.* Generate lnqt

. g lnqt=lnst if lnst<lndt
(22 missing values generated)

. replace lnqt=lndt if lndt<lnst
(22 real changes made)

.* Estimate model (3) and (4) using OLS

. reg3 (lnqt lnpd lnpx2 lnpx3 lnpx4) (lnqt lnpd lngdp), ols

Multivariate regression
----------------------------------------------------------------------
Equation          Obs  Parms        RMSE    "R-sq"     F-Stat        P
----------------------------------------------------------------------
lnqt               22      4     .136235    0.9201      48.95   0.0000
2lnqt              22      2    .1391259    0.9069      92.53   0.0000
----------------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnqt         |
        lnpd |  -1.353506   .3722912    -3.64   0.001    -2.108548   -.5984645
       lnpx2 |  -.3864994   .1180437    -3.27   0.002    -.6259031   -.1470957
       lnpx3 |  -.6782817   .2131651    -3.18   0.003    -1.110601   -.2459629
       lnpx4 |  -.3606189   .2837767    -1.27   0.212    -.9361448    .2149069
       _cons |   40.10218   3.019386    13.28   0.000     33.97858    46.22578
-------------+----------------------------------------------------------------
2lnqt        |
        lnpd |  -2.181329   .2946999    -7.40   0.000    -2.779008    -1.58365
       lngdp |   .5776586   .0887536     6.51   0.000      .397658    .7576593
       _cons |   31.03578   3.761201     8.25   0.000     23.40771    38.66385
------------------------------------------------------------------------------

.* Estimate model (3) and (4) using 2SLS

. reg3 (lnqt lnpd lnpx2 lnpx3 lnpx4) (lnqt lnpd lngdp), 2sls inst(lnpx2 lnpx3
lnpx4 lngdp)

Two-stage least-squares regression
----------------------------------------------------------------------
Equation          Obs  Parms        RMSE    "R-sq"     F-Stat        P
----------------------------------------------------------------------
lnqt               22      4    .2329302    0.7665      15.68   0.0000
2lnqt              22      2    .1454858    0.8982      77.04   0.0000
----------------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
lnqt         |
        lnpd |   .7752765   1.547291     0.50   0.619    -2.362776    3.913329
       lnpx2 |  -.5909191   .2430523    -2.43   0.020    -1.083852   -.0979861
       lnpx3 |  -.7971771   .3728771    -2.14   0.039    -1.553407   -.0409473
       lnpx4 |  -.9608797   .6273359    -1.53   0.134    -2.233176    .3114165
       _cons |   24.95604    11.2843     2.21   0.033      2.07042    47.84166
-------------+----------------------------------------------------------------
2lnqt        |
        lnpd |  -2.574157   .4354519    -5.91   0.000    -3.457295    -1.69102
       lngdp |   .5212921   .1027745     5.07   0.000     .3128558    .7297283
       _cons |   35.93499   5.494663     6.54   0.000      24.7913    47.07868
------------------------------------------------------------------------------
Endogenous variables:  lnqt lnpd
Exogenous variables:   lnpx2 lnpx3 lnpx4 lngdp
------------------------------------------------------------------------------
```

.* Estimate model (3) and (4) using 3SLS

```
. reg3 (lnqt lnpd lnpx2 lnpx3 lnpx4) (lnqt lnpd lngdp), 3sls inst(lnpx2 lnpx3
lnpx4 lngdp)

Three-stage least-squares regression
----------------------------------------------------------------------
Equation          Obs   Parms        RMSE    "R-sq"       chi2        P
----------------------------------------------------------------------
lnqt               22       4    .2056595    0.7644      81.74   0.0000
2lnqt              22       2     .135203    0.8982     178.41   0.0000
----------------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lnqt         |
        lnpd |   .7879239   1.360114     0.58   0.562    -1.877851    3.453699
       lnpx2 |  -.6046439   .2134422    -2.83   0.005    -1.022983   -.1863049
       lnpx3 |  -.8372831   .3273419    -2.56   0.011    -1.478861   -.1957047
       lnpx4 |  -.9111679   .5511692    -1.65   0.098     -1.99144    .1691039
       _cons |   24.81121   9.918929     2.50   0.012     5.370467    44.25195
-------------+----------------------------------------------------------------
2lnqt        |
        lnpd |  -2.574157   .4046743    -6.36   0.000    -3.367304    -1.78101
       lngdp |   .5212921   .0955104     5.46   0.000     .3340951     .708489
       _cons |   35.93499   5.106302     7.04   0.000     25.92682    45.94316
------------------------------------------------------------------------------
Endogenous variables:  lnqt lnpd
Exogenous variables:   lnpx2 lnpx3 lnpx4 lngdp
------------------------------------------------------------------------------
```

e. What are the problems, in term of economic concept and econometric technique, of the estimated results in **d**?

In term of economic and econometric concept, the problem in **d** is identification problem. Unfortunately, the models are identified system in this case. Additionally, the estimated results of coefficient of price in demand and supply models both have correct signs. However, the equilibrium condition assumption is the most important assumption that make the models become simultaneous equation model. If the equilibrium condition assumption doesn’t hold, the models will be incorrect.