Japanese Accelerator-Multiplier Interaction model – JAMI

SASAI Yasuhiko

Introduction


Since 2001, Japanese government adopted new method of calculation and definition of some component of National Account. The new system intends to catch up recent economic and industrial development. For example, the payment of computer soft wear is treated in old system as an intermediate input but in the new system, it is treated as a gross capital formation. The big issue of recent Japanese economy, redemption of large bad loan or non-performing loan is classified as “Change in amount of other asset” in “Adjustment of stock” account. In the old system, the depreciation of social stock is ignored but in the new system, they are calculated as government final consumption expenditure. Another big change is in the private(household) final consumption expenditure. The system gets more complicated but reflects better the activities of real economy.

The data published with the new method in Japan can covers only from 1980 1st quarter on main accounts. The detailed accounts covers only from 1990 1st quarter. Accordingly, we should make two quarterly models; one is based old data named Jamiq1, and the other is based new data, named Jamiq2. We have also yearly models named Jamiy1 and Jamiy2. If the statistical agency abandons the effort to prepare the retrospective data with new method before 1990, we should adjust old data to new method with some artificial methods but for the moment, we are still waiting for the effort of the statistical agency.

1. Structure of JAMI

I want to explain here the quarterly model of JAMI based on new data, namely JAMIQ2. There are 6 master files in JAMIQ2 which means the model grows up step by step from the simple tautological model to a complicated one same as AMI. The most difficult point in constructing JAMIQ2 is to find the route starting from production to disposable income. The income sector of
SNA is enough complicated with many accountant items.

The basic master file of JAMIQ is shown as follows. Making it easy to understand, I attached AMI argument in the same table. The complicated and detailed income account in Japanese SNA, I separated them in special column box. The explanation of Jamiq arguments are headed by chapter number of *the Annual Report of National Account* published by General Affairs Agency of Japan.

### Production Account

<table>
<thead>
<tr>
<th>JAMI</th>
<th>AMI</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ c</td>
<td></td>
<td>Personal consumption expenditure</td>
</tr>
<tr>
<td>+ gcepr</td>
<td>1.-1. 1) Private final consumption expenditure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final consumption expenditure of households</td>
</tr>
<tr>
<td>+ fccnp</td>
<td>1.-1. 2) Final consumption expenditure of private non-profit institutions serving households</td>
<td></td>
</tr>
<tr>
<td>+ v</td>
<td></td>
<td>Gross private domestic investment</td>
</tr>
<tr>
<td>+ cffpr</td>
<td>1.-3.-1)-a. Gross domestic capital formation by public sectors</td>
<td></td>
</tr>
<tr>
<td>+ cffpu</td>
<td>1.-3.-1)-b. Gross domestic fixed capital formation by public sectors</td>
<td></td>
</tr>
<tr>
<td>+ sin</td>
<td>1.-3.-2) Increase in stocks</td>
<td></td>
</tr>
<tr>
<td>+ fe</td>
<td></td>
<td>Exports of goods and services</td>
</tr>
<tr>
<td>+ ex</td>
<td></td>
<td>1.-4.-1) Exports of goods and services</td>
</tr>
<tr>
<td>fi</td>
<td></td>
<td>Imports of goods and services</td>
</tr>
<tr>
<td>- im</td>
<td>1.-4.-2) Imports of goods and service</td>
<td></td>
</tr>
<tr>
<td>+ g</td>
<td></td>
<td>Government purchase of goods and services</td>
</tr>
<tr>
<td>+ fcego</td>
<td>1.-2. Government final consumption expenditure</td>
<td></td>
</tr>
<tr>
<td>= gdp</td>
<td>= gdp</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td></td>
<td>+ fefaci</td>
<td>Exports of factor income</td>
</tr>
<tr>
<td>+ fie</td>
<td></td>
<td>1. Factor incomes from the rest of the world</td>
</tr>
<tr>
<td>fifaci</td>
<td></td>
<td>Imports of factor income</td>
</tr>
<tr>
<td>- fii</td>
<td>1.(Less) Factor incomes to the rest of the world</td>
<td></td>
</tr>
<tr>
<td>= gnp</td>
<td>= gnp</td>
<td>Gross national product</td>
</tr>
<tr>
<td></td>
<td>- deprf</td>
<td>Capital consumption allowances</td>
</tr>
<tr>
<td>- sdxf</td>
<td></td>
<td>1.6 Statistical discrepancy</td>
</tr>
</tbody>
</table>
\[
\begin{align*}
\text{= nnp} & \quad \text{= nnp} \quad \text{Net national product} \\
\hline
\text{Income account} & \\
+ \text{nnp} & \quad \text{Net national product} \\
\text{nbtrp} & \quad \text{Business transfer payments} \\
+ \text{nbtrpp} & \quad \text{Business transfer payments to persons} \\
\text{niprf} & \quad \text{Corporate profits with capital consumption and inventory valuation adjustment} \\
\text{- ienaf} & \quad 3. \text{Entrepreneurial income (after receipt and payment of dividends)} \\
+ \text{ienafin} & \quad 3.-3) \text{Private unincorporated enterprises} \\
\text{- iprnb} & \quad 2. \text{Property income (non-entrepreneurial)} \\
+ \text{npdivi} & \quad \text{Dividend payments to persons} \\
+ \text{divhor} & \quad 2.-2.-3)-2 \text{Dividends} \\
\text{netint} & \quad \text{Net interest} \\
+ \text{npini} & \quad \text{Personal interest income} \\
+ \text{intho} & \quad 2.-2.-3)-1 \text{Interest} \\
+ \text{renhor} & \quad 2.-2.-3)-3 \text{Rent (receipts)} \\
\text{- nwald} & \quad \text{Wage accruals less disbursements} \\
\text{- nsd} & \quad \text{Statistical discrepancy} \\
\text{= pibg} & \quad \text{Personal income before government action} \\
\text{= pibg} & \quad \text{Personal income before government action}
\end{align*}
\]
## II. Institutional 5. Household

- **nlphop** 3. casualty insurance premiums

+ **nlchor** 14. Casualty insurance claims

- **fahhop** 5. Compulsory fees, fines and penalties

- **sschop** 6. Social security contributions

+ **ssbhor** 15. Social security benefits

+ **saghor** 16. Social assistance grants

- **ctphop** 7. Current transfers to private non-profit institutions serving households

- **ewchop** 8. Unfunded employee welfare contributions imputed

+ **ewbhor** 17. Unfunded employee welfare benefits

- **ctohop** 9. Current transfers not elsewhere classified

+ **ctohor** 18. Current transfers not elsewhere classified

= **ctrh** 7.-4) Other current transfers received, net – Households (including private)

- **tdihop** 5.-4. Direct taxes

= **ctoho** 7.-2) Other current transfer Households (including private unincorporated non-financial enterprise)

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+ **pibg** Personal income before government

+ **ngtp** Government transfer payments to persons unincorporated non-financial enterprises

+ **nsub** Subsidies(net)

- **tidgor** 2. 8 (1.4) Indirect taxes

+ **subgop** 2. 9 (1.5) (less) Subsidies

- **nibtax** Indirect business tax

- **nconsi** Contribution for social insurance

= **pi** Personal income

- **ctoho** 7.-2) Other current transfer Households (including private unincorporated non-financial enterprise)

- **pitax** Personal tax

= **pidis** Personal disposable income

= **disincS** Disposable income of household
- c  Personal consumption expenditure
- fcehop  5.-1. Final consumption expenditure
- piipcb  Interest paid by consumers to business
- pipttf  Personal transfers to foreigners
= pisav  Personal saving
= savhop  5.-10. Saving

2. Functions

Starting from this pure-accounting model, I added 4 functions as follows;

Investment of private sectors  cffmopr$.reg
Change in inventory  sin$.reg
Imports  im$.reg
GDP deflator  gdpD.reg

The result of these function estimation is as follows;

Investment of private sectors

<table>
<thead>
<tr>
<th>ti Gross Private Domestic Fixed Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>lim 1992.4 2001.1</td>
</tr>
<tr>
<td>fex gdp$ = gcepr$ + fc ego$ + cffpr$ + cffpu$ + sin$ + ex$ - im$</td>
</tr>
<tr>
<td>f pgdp$ = @peak(pgd$p$, gdp$, .00)</td>
</tr>
<tr>
<td>f d = pgdp$ - pgdp$[1]</td>
</tr>
<tr>
<td>f ub05 = @cum(ub05, 1.0, .05)</td>
</tr>
<tr>
<td>spr ub05</td>
</tr>
<tr>
<td>f replace = .05*@cum(stock, cffpr$[4], .05)/ub05</td>
</tr>
<tr>
<td>spr replace</td>
</tr>
<tr>
<td>r cffpr$ = replace, d[1], d[2], d[3], d[4], d[5], d[6], d[7], d[8], d[9], d[10]</td>
</tr>
</tbody>
</table>

:                    Gross Private Domestic Fixed Investment
SEE     =  1295.26  RSQ     =  0.5849  RHO     =  0.51  Obser    =  34 from 1992.400
SEE+1   =  1138.66  RBSQ    =  0.3773  DW     =  0.97  DoFree  =  22 to  2001.100
Change in inventory

ti sin$ Change in Inventory
lim 1992.1 2001.1
# fs stand for "final sales"
f fs$ = gcepr$ + fcego$ + ex$
#f fs$ = gcepr$ + fcego$ + cffpr$ + cffpu$ + ex$
\[ f \text{dfs} = fs - fs[1] \]
\[ r \text{sin} = ![dfs[1], dfs[2], dfs[3], dfs[4]] \]

\[ \text{sin} \text{ Change in Inventory} \]

\[
\begin{array}{llllllll}
\text{Variable name} & \text{Reg-Coeff} & \text{Maxval} & \text{Elastic} & \text{NorRes} & \text{Mean} & \text{Beta} \\
0 \text{sin} & - - - - - - - - - - - - - - - - - & 135.18 & - - - & \\
1 \text{dfs}[1] & -0.03191 & 1.0 & -0.15 & 2.77 & 648.01 \\
2 \text{dfs}[2] & 0.10770 & 10.2 & 0.45 & 2.76 & 564.31 & 0.502 \\
3 \text{dfs}[3] & 0.00086 & 0.0 & 0.00 & 1.75 & 549.05 & 0.004 \\
4 \text{dfs}[4] & 0.19616 & 32.4 & 0.55 & 1.00 & 379.70 & 0.939 \\
\end{array}
\]

\[ \text{sin} \text{ Change in Inventory} \]

**Imports**

\[
\text{ti im} = \text{Imports} \\
\text{lim} = 1991.4 \text{ 2001.1} \\
\text{fex gdp} = \text{gde} \\
\text{f cff} = \text{cfpr} + \text{cftp} + \text{sin} \\
\text{f cef} = \text{gcep} + \text{fego} \\
\text{f dd} = \text{cfs} + \text{cef} \\
\]
\[ f \text{ ddd} = c \text{fpr} + c \text{fpu} + g \text{cepr} \]

\# r im$ = \text{exrat, cff$, dd}$
\# r im$ = \text{cef$, cef[]1, cef[]2, cef[]3, exrat}$
\r im$ = \text{ddd$, ddd[]1, ddd[]2, ddd[]3}$

\[
\begin{align*}
\text{SEE} & = 402.42 \quad \text{RSQ} = 0.9123 \quad \text{RHO} = 0.65 \quad \text{Obser} = 38 \text{ from } 1991.400 \\
\text{SEE+1} & = 307.55 \quad \text{RBSQ} = 0.9017 \quad \text{DW} = 0.70 \quad \text{DoFree} = 33 \text{ to } 2001.100 \\
\text{MAPE} & = 3.28 \\
\end{align*}
\]

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Reg-Coef</th>
<th>Mexval</th>
<th>Elas</th>
<th>NorRes</th>
<th>Mean</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 im$</td>
<td>--------</td>
<td>------</td>
<td>-----</td>
<td>--------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>1 intercept</td>
<td>-33355.26676</td>
<td>166.9</td>
<td>-3.40</td>
<td>11.41</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>2 ddd$</td>
<td>0.19834</td>
<td>33.0</td>
<td>2.13</td>
<td>7.88</td>
<td>105499.60</td>
<td>0.920</td>
</tr>
<tr>
<td>3 ddd[1]</td>
<td>0.01727</td>
<td>0.3</td>
<td>0.19</td>
<td>6.69</td>
<td>105206.97</td>
<td>0.080</td>
</tr>
<tr>
<td>4 ddd[2]</td>
<td>0.17337</td>
<td>25.2</td>
<td>1.85</td>
<td>1.01</td>
<td>104634.88</td>
<td>0.808</td>
</tr>
<tr>
<td>5 ddd[3]</td>
<td>0.02179</td>
<td>0.5</td>
<td>0.23</td>
<td>1.00</td>
<td>104397.84</td>
<td>0.102</td>
</tr>
</tbody>
</table>

**GDP deflator**

ti GDP Deflator -- simulation

\[ \text{fex gdpD} = \text{gde/gde}$ \]
\[ \text{f ex lgdpD} = 100.*@log(gdpD) \]
\[ \text{fex infl} = \text{lgdpD - lgdpD[4]} \]
f one = 1
freq one 4
f ub10 = @cum(ub10, one, .10)
f ub20 = @cum(ub20, one, .20)
# call expected inflation "inflex"
f inflex = @cum(cinfl, infl[1], .10)/ub10
f cinflex = @cum(cinflex, infl, .0)
fex u = 100.*(labforq - empq)/labforq
f cu = @cum(cu, u, .0)
fex rlp = (im/im$)/(ex/ex$)
f relpri = @log(rlp)
f inflimp = 100.*(relpri - relpri[4])
f cinflimp = @cum(xinflimp, inflimp, .0)
sma 100 a3 a5 1
con 100 0.05 = a6
r lgdpD = cinflex, cu[3], cu[4], cu[5], cinflimp[3], cinflimp[4]

: GDP Deflator -- simulation
SEE = 1.56 RSQ = 0.4846 RHO = -0.91 Obser = 36 from 1992.200
SEE+1 = 0.60 RBSQ = 0.3779 DW = 3.81 DoFree = 29 to 2001.100
MAPE = 231.36

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Reg-Coeff</th>
<th>Mexval</th>
<th>Elas</th>
<th>NorRes</th>
<th>Mean</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 lgdpD</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1 intercept</td>
<td>-0.40016</td>
<td>0.2</td>
<td>0.43</td>
<td>2.04</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>2 cinflex</td>
<td>0.24948</td>
<td>9.6</td>
<td>-5.41</td>
<td>1.97</td>
<td>20.14</td>
<td>0.545</td>
</tr>
<tr>
<td>3 cu[3]</td>
<td>-0.03683</td>
<td>4.9</td>
<td>2.57</td>
<td>1.29</td>
<td>64.87</td>
<td>-0.582</td>
</tr>
<tr>
<td>4 cu[4]</td>
<td>-0.02462</td>
<td>8.0</td>
<td>1.63</td>
<td>1.21</td>
<td>61.58</td>
<td>-0.380</td>
</tr>
<tr>
<td>5 cu[5]</td>
<td>-0.01235</td>
<td>1.1</td>
<td>0.78</td>
<td>1.20</td>
<td>58.36</td>
<td>-0.186</td>
</tr>
<tr>
<td>6 cinflimp[3]</td>
<td>0.05039</td>
<td>5.7</td>
<td>0.91</td>
<td>1.00</td>
<td>-16.86</td>
<td>0.305</td>
</tr>
<tr>
<td>7 cinflimp[4]</td>
<td>0.00468</td>
<td>0.0</td>
<td>0.09</td>
<td>1.00</td>
<td>-16.90</td>
<td>0.028</td>
</tr>
</tbody>
</table>
4. Conclusion

Jamiq2 is only the basic model and it is prepared for the base of next development. The investment function has enough room to be ameliorated and other more useful function should be added. Japanese team has opened an internet web site [http://www.jidea.jp](http://www.jidea.jp) to update the data bank and to exchange the knowledge on macro model building with “G7”, but unfortunately, for the moment, they are written in Japanese. We will soon remake it in English. Anyway, you can download periodically Japanese SNA bank and Japanese macro model based on “G7” from this web site. The data bank has “jamiq.stb” file and you can easily consult latest Japanese National Account.

We will continue to study Jamiq2 to adopt better to Japanese economy and we hope that the model building knowledge based on “G7” will be popular in Japan.