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Japanese Accelerator-Multiplier Interaction model – JAMI

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Introduction

Y. Sasai, T. Hasegawa, and T. Imagawa translated Clopper Almon's textbook "***The Craft of Economic Modeling***" in Japanese, supplemented JAMI, Japanese AMI model, to help readers understand how to make model. The main difference between AMI and JAMI consist of the difference of National Account system of US and of Japan. Japanese National Account system is based on United Nations' SNA93 (System of National Account 1993) and it changed drastically in some parts.

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

JAMI	AMI	Explanation
	+ c	Personal consumption expenditure
+ gcepr		1.-1. 1) Private final consumption expenditure Final consumption expenditure of households
+ fcenp		1.-1. 2) Final consumption expenditure of private non-profit institutions serving households
	+ v	Gross private domestic investment
+ cffpr		1.-3.-1)-a. Gross domestic capital formation by public sectors
+ cffpu		1.-3.-1)-b. Gross domestic fixed capital formation by public sectors
+ sin		1.-3.-2) Increase in stocks
	+ fe	Exports of goods and services
+ ex		1.-4.-1) Exports of goods and services
	fi	Imports of goods and services
- im		1.-4.-2) Imports of goods and service
	+ g	Government purchase of goods and services
+ fcego		1.-2. Government final consumption expenditure
= gdp	= gdp	Gross domestic product
	+ fefaci	Exports of factor income
+ fie		1. Factor incomes from the rest of the world
	fifaci	Imports of factor income
- fii		1.(Less) Factor incomes to the rest of the world
= gnp	= gnp	Gross national product
- deprf	ncca	Capital consumption allowances
- sdxf		1.6 Statistical discrepancy

= nnp	= nnp	Net national product

Income account

+ nnp		Net national product
	nbtrp	Business transfer payments
	+ nbtrpp	Business transfer payments to persons
	niprf	Corporate profits with capital consumption and inventory valuation adjustment
- ienaf		3. Entrepreneurial income (after receipt and payment of dividends)
+ ienafin		3.-3)Private unincorporated enterprises
- iprnb		2. Property income (non-entrepreneurial)
	+ npdivi	Dividend payments to persons
+ divhor		2.-2.-3)-2 Dividends
	netint	Net interest
	+ npini	Personal interest income
+ intho		2.-2.-3)-1 Interest
+ renhor		2.-2-3)-3 Rent (receipts)
	- nwald	Wage accruals less disbursements
	- nsd	Statistical discrepancy
	= pibg	Personal income before government action
= pibg		Personal income before government

	II. Institutional 5. Household
- nlphop	3. casualty insurance premiums
+ nlchor	14. Casualty insurance claims
- fafhop	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)

+ pibg		Personal income before government
	+ ngttp	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

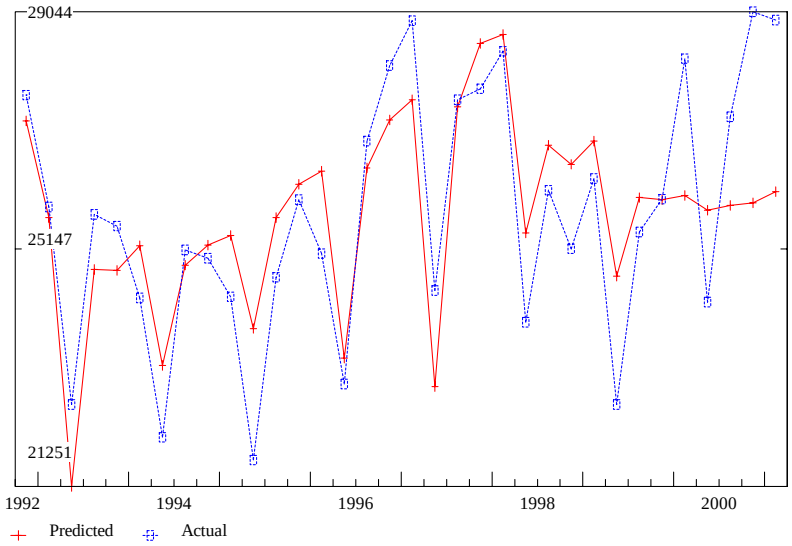
```
ti Gross Private Domestic Fixed Investment
lim 1992.4 2001.1
fex gdp$ = gcepr$ + fcego$ + cffpr$ + cffpu$ + sin$ + ex$ - im$
f pgdp$ = @peak(pgdp$, gdp$, .00)
f d = pgdp$ - pgdp$[1]
f ub05 = @cum(ub05, 1.0, .05)
spr ub05
f replace = .05*@cum(stock, cffpr$[4], .05)/ub05
spr replace
r cffpr$ = replace, d[1], d[2], d[3], d[4], d[5], d[6], d[7], d[8], d[9], d[10]

:                    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
```

MAPE = 4.11

	Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta
0	cffpr$	- - - - - - - - - - - - - - - - -				25705.07 - - -	
1	intercept	4749.57584	0.4	0.18	2.41	1.00	
2	replace	16.80727	8.3	0.79	2.28	1205.42	0.400
3	d[1]	0.08680	0.1	0.00	2.21	319.14	0.040
4	d[2]	-0.50391	3.4	-0.01	1.91	304.99	-0.234
5	d[3]	0.36945	2.3	0.00	1.86	304.99	0.172
6	d[4]	0.65637	7.5	0.01	1.50	395.46	0.341
7	d[5]	0.59035	4.1	0.01	1.26	395.46	0.307
8	d[6]	0.22430	0.6	0.00	1.23	395.46	0.116
9	d[7]	0.26573	1.4	0.00	1.20	395.46	0.138
10	d[8]	0.14179	1.0	0.00	1.11	703.45	0.141
11	d[9]	0.19616	2.0	0.01	1.08	860.09	0.208
12	d[10]	-0.28637	4.1	-0.01	1.00	860.09	-0.304

Gross Private Domestic Fixed Investment



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 dfs$ = fs$ - fs$[1]

r sin$ = ! dfs$[1], dfs$[2], dfs$[3], dfs$[4]

: sin$ Change in Inventory

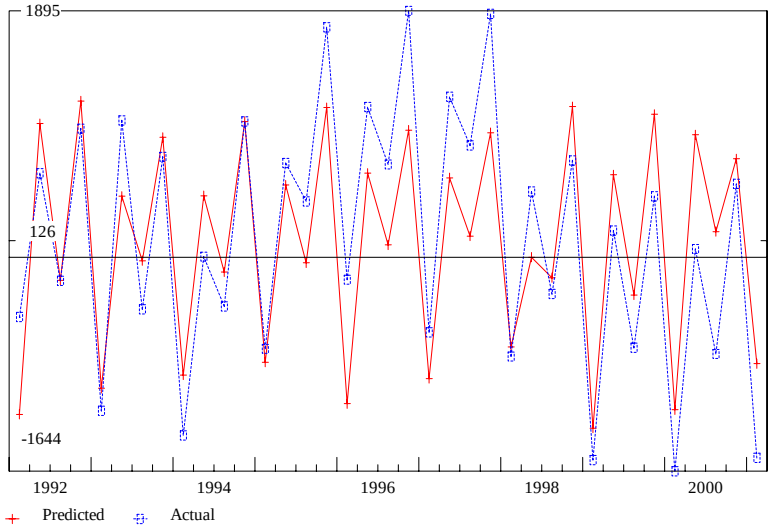
SEE = 529.04 RSQ = 0.6934 RHO = 0.65 Obser = 37 from 1992.100

SEE+1 = 416.21 RBSQ = 0.6656 DW = 0.69 DoFree = 33 to 2001.100

MAPE = 682.74

Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta
0 sin$	- - - - - - - - - - - - - - - - -				135.18 - - -	
1 dfs$[1]	-0.03191	1.0	-0.15	2.77	648.01	
2 dfs$[2]	0.10770	10.2	0.45	2.76	564.31	0.502
3 dfs$[3]	0.00086	0.0	0.00	1.75	549.05	0.004
4 dfs$[4]	0.19616	32.4	0.55	1.00	379.70	0.939

sin$ Change in Inventory



Imports

ti im$ Imports

lim 1991.4 2001.1

fex gdp$ = gde$

f cff$=cffpr$+cffpu$+sin$

f cef$=gcepr$+fcego$

f dd$=cff$+cef$

f ddd$=cffpr$+cffpu$+gcepr$

#r im$ = exrat, cff$, dd$

#r im$ = cef$,cef$[1],cef$[2],cef$[3],exrat

r im$ = ddd$,ddd$[1],ddd$[2],ddd$[3]

: im$ Imports

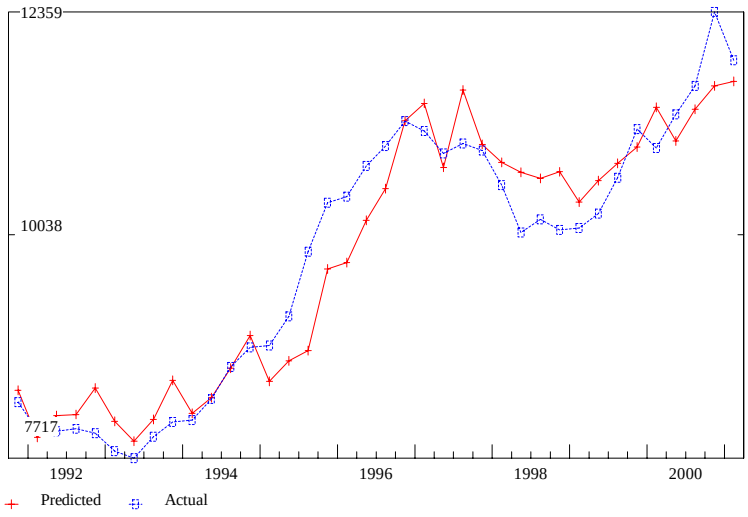
SEE = 402.42 RSQ = 0.9123 RHO = 0.65 Obser = 38 from 1991.400

SEE+1 = 307.55 RBSQ = 0.9017 DW = 0.70 DoFree = 33 to 2001.100

MAPE = 3.28

Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta
0 im$	- - - - - - - - - - - - - - - - -				9801.60 - - -	
1 intercept	-33355.26676	166.9	-3.40	11.41	1.00	
2 ddd$	0.19834	33.0	2.13	7.88	105499.60	0.920
3 ddd$[1]	0.01727	0.3	0.19	6.69	105206.97	0.080
4 ddd$[2]	0.17337	25.2	1.85	1.01	104634.88	0.808
5 ddd$[3]	0.02179	0.5	0.23	1.00	104397.84	0.102

im$ Imports



GDP deflator

ti GDP Deflator -- simulation

lim 1992.2 2001.1

fex gdpD = gde/gde$

f lgdpD = 100.*@log(gdpD)

fex infl = lgdpD - lgdpD[4]

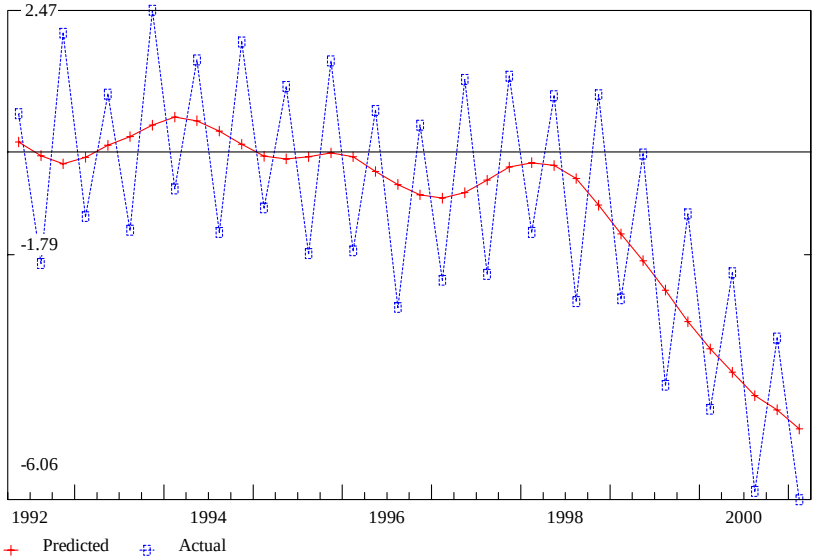
```
f one = 1
freq one 4
f ub10 = @cum(ub10, one, .10)
f ub20 = @cum(ub20, one, .20)
# call expected inflation "inflex"
f inflex = @cum(cinfl, infl[1], .10)/ub10
f cinflex = @cum(cinflex, inflex, .0)
fex u = 100.*(labforq - empq)/labforq
f cu = @cum(cu, u, .0)
fex rlp = (im/im$)/(ex/ex$)
f relpri = @log(rlp)
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

Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta
0 lgdpD	- - - - - - - - - - - - - - - - -			-0.93	- - -	
1 intercept	-0.40016	0.2	0.43	2.04	1.00	
2 cinflex	0.24948	9.6	-5.41	1.97	20.14	0.545
3 cu[3]	-0.03683	4.9	2.57	1.29	64.87	-0.582
4 cu[4]	-0.02462	8.0	1.63	1.21	61.58	-0.380
5 cu[5]	-0.01235	1.1	0.78	1.20	58.36	-0.186
6 cinflimp[3]	0.05039	5.7	0.91	1.00	-16.86	0.305
7 cinflimp[4]	0.00468	0.0	0.09	1.00	-16.90	0.028

GDP Deflator -- simulation



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 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 down load 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.