WELCOME
Session 16 & 17

Implementation of the EXTER model in GAMS
Calibration and Simulation of the model

EXTER Model with GAMS & Simulation

Value of Parameters (1)

Definition	Symbol	Value
Scale parameter – Cobb-Douglas	A_{agr}	1.755
	A_{man}	1.960
	A_{ser}	1.890
Scale parameter – CET	A_{agr}^E	2.040
	A_{man}^E	3.328
	A_{ser}^E	4.267
Scale parameter – CES	A_{agr}^M	1.712
	A_{man}^M	1.918
	A_{ser}^M	1.012
Intermediate consumption coefficient – Leontief	$aij_{agr,agr}$	0.204
	$aij_{man,agr}$	0.490
	$aij_{ser,agr}$	0.306
	$aij_{agr,man}$	0.205
	$aij_{man,man}$	0.591
	$aij_{ser,man}$	0.205
	$aij_{agr,ser}$	0.203
	$aij_{man,ser}$	0.440
	$aij_{ser,ser}$	0.356
	$aij_{agr,pub}$	0.204
	$aij_{man,pub}$	0.490
	$aij_{ser,pub}$	0.303
Elasticity – Cobb-Douglas	α_{agr}	0.750
	α_{man}	0.400
	α_{ser}	0.667
Distribution parameter – CET	β_{agr}^E	0.581
	β_{man}^E	0.961
	β_{ser}^E	0.942
Distribution parameter – CES	β_{agr}^M	0.295
	β_{man}^M	0.684
	β_{ser}^M	7.598E-11
Share of commodity in the consumption budget of salaried households	$\gamma_{agr,sal}$	0.167
	$\gamma_{man,sal}$	0.333
	$\gamma_{ser,sal}$	0.500
Share of commodity in the consumption budget of capitalists households	$\gamma_{agr,cap}$	0.048
	$\gamma_{man,cap}$	0.524
	$\gamma_{ser,cap}$	0.429

(2)

Definition	Symbol	Value
Total intermediate consumption coefficient – Leontief	io_{agr}	0.191
	io_{man}	0.571
	io_{ser}	0.479
	io_{pub}	0.239
Shares of capital income	λ	0.600
	λ^{R}	0.100
Share of commodity in total investment expenditures	μ_{agr}	0.137
	μ_{man}	0.863
	μ_{ser}	
Propensity to save	ψ_{sal}	0.289
	ψ_{cap}	0.167
Elasticity parameter – CET	ρ^{E}_{agr}	1.667
	ρ^{E}_{man}	3.000
	ρ^{E}_{ser}	2.000
Elasticity parameter – CES	ρ^{M}_{agr}	-0.500
	ρ^{M}_{man}	0.667
	ρ^{M}_{ser}	4.000
Elasticity – CET	σ^{E}_{agr}	1.500
	σ^{E}_{man}	0.500
	σ^{E}_{ser}	1.000
Elasticity – CES	σ^{M}_{agr}	2.000
	σ^{M}_{man}	0.600
	σ^{M}_{ser}	0.200
Indirect tax rate – exports	te_{agr}	0.105
	te_{man}	0
	te_{ser}	0
Indirect tax rate – imports	tm_{agr}	0.040
	tm_{man}	0.100
	tm_{ser}	0.400
Indirect tax rate – local	tx_{agr}	0.022
	tx_{man}	0.007
	tx_{ser}	0.023
Direct tax rate on firms' income	tyf	0.067
Direct tax rate on households' income	tyh_{sal}	0.050
	tyh_{cap}	0.100
Value-added coefficient – Leontief	v_{agr}	0.800
	v_{man}	0.400
	v_{ser}	0.500
	v_{pub}	0.750

Simulations (1)

• services	$DI_{agr,ser}$	58.378	58.747	0.631
	$DI_{man,ser}$	126.441	127.239	0.631
	$DI_{ser,ser}$	29.231	29.145	0.631
• public administrations	$DI_{agr,pub}$	9.730	9.790	0.624
	$DI_{man,pub}$	23.415	23.561	0.624
	$DI_{ser,pub}$	14.615	14.707	0.624
INCOME AND SAVINGS				
Income				
• workers	YH_{sal}	800	799.628	-0.046
• capitalists	YH_{cap}	280	278.742	-0.449
• firms	YF	105	104.371	-0.599
• government	YG	208	168.480	-19.000
Disposable income				
• workers	YDH_{sal}	760	759.647	-0.046
• capitalists	YDH_{cap}	252	250.868	-0.449
Receipts from direct taxation				
• workers	DTH_{sal}	40	39.981	-0.046
• capitalists	DTH_{cap}	28	27.874	-0.449
• firms	DTF	7	6.958	-0.599
Receipts from indirect taxation				
• agriculture	TI_{agr}	8	7.847	-1.909
• manufacturing	TI_{man}	10	9.623	-3.768
• services	TI_{ser}	13	12.941	-0.452
Receipts from import duties				
• agriculture	TIM_{agr}	2	1.946	-2.705
• manufacturing	TIM_{man}	78	39.184	-49.763
• services	TIM_{ser}	2	2.007	0.363
Receipts from export taxes				
• agriculture	TIE_{agr}	20	20.117	0.586
• manufacturing	TIE_{man}	0	0.000	-
• services	TIE_{ser}	0	0.000	-
Savings				
• workers	SH_{sal}	220	219.898	-0.046
• capitalists	SH_{cap}	42	41.811	-0.449
• firms	SF	20	19.413	-2.936
• government	SG	-42	-81.520	94.095
DEMAND				
Salaried households – consumption				
• agriculture	$C_{agr,sal}$	87.568	88.243	0.771
• manufacturing	$C_{man,sal}$	168.588	175.043	3.829
• services	$C_{ser,sal}$	263.077	265.646	0.977
• total budget	CTH_{sal}	540	539.749	-0.046

(2)

Price of local sales (including taxes)				
• agriculture	PD_{agr}	1.022	1.012	-0.946
• manufacturing	PD_{man}	1.007	0.983	-2.383
• services	PD_{ser}	1.023	1.012	-1.026
Price of imports (including taxes)				
• agriculture	PM_{agr}	1.063	1.063	-
• manufactures	PM_{man}	1.108	1.058	-4.545
• services	PM_{ser}	1.432	1.432	-
PRODUCTION AND FACTORS				
Output				
• agriculture	XS_{agr}	500	498.525	-0.295
• manufacturing	XS_{man}	625	620.847	-0.664
• services	XS_{ser}	600	603.786	0.631
• public administrations	XS_{pub}	200	201.248	0.624
Value added				
• agriculture	VA_{agr}	400	398.820	-0.295
• manufacturing	VA_{man}	250	248.339	-0.664
• services	VA_{ser}	300	301.893	0.631
• public administrations	VA_{pub}	150	150.936	0.624
Labour				
• agriculture	LD_{agr}	300	298.821	-0.393
• manufacturing	LD_{man}	100	98.347	-1.653
• services	LD_{ser}	200	201.896	0.948
• public administrations	LD_{pub}	150	150.936	0.624
• total	LS	750	750	0
Capital				
• agriculture	KD_{agr}	100	100.000	-
• manufacturing	KD_{man}	150	150.000	-
• services	KD_{ser}	100	110.000	-
Total intermediate consumption				
• agriculture	CI_{agr}	95.520	95.238	-0.295
• manufacturing	CI_{man}	356.785	354.414	-0.664
• services	CI_{ser}	287.127	288.939	0.631
• public administrations	CI_{pub}	47.760	48.058	0.624
Intermediate consumption				
• agriculture	$DI_{agr,agr}$	19.459	19.402	-0.295
	$DI_{man,agr}$	46.830	46.692	-0.295
	$DI_{ser,agr}$	29.231	29.145	-0.295
• manufacturing	$DI_{agr,man}$	72.973	72.488	-0.664
	$DI_{man,man}$	210.735	209.335	-0.664
	$DI_{ser,man}$	73.077	72.591	-0.664

(3)

• services	$DI_{agr,ser}$	58.378	58.747	0.631
	$DI_{man,ser}$	126.441	127.239	0.631
	$DI_{ser,ser}$	29.231	29.145	0.631
• public administrations	$DI_{agr,pub}$	9.730	9.790	0.624
	$DI_{man,pub}$	23.415	23.561	0.624
	$DI_{ser,pub}$	14.615	14.707	0.624

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Income

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• total budget	CTH_{sal}	540	539.749	-0.046

(4)

Capitalists – consumption				
• agriculture	$C_{agr,cap}$	9.730	9.765	0.365
• manufacturing	$C_{man,cap}$	103.026	106.540	3.411
• services	$C_{ser,cap}$	87.692	88.192	0.570
• total budget	CTH_{cap}	210	209.056	-0.449
Intermediate demand				
• agriculture	DIT_{agr}	160.541	160.427	-0.071
• manufacturing	DIT_{man}	407.421	406.826	-0.146
• services	DIT_{ser}	219.231	219.396	0.075
Demand for investment purposes				
• agriculture	INV_{agr}	102.162	97.580	-4.485
• manufacturing	INV_{man}	620.965	611.113	-1.587
• total	IT	768	727.602	-5.260
Current public expenditure				
• government	G	200	200.000	-
Demand for the local commodity				
• agriculture	D_{agr}	310	307.403	-0.838
• manufacturing	D_{man}	520	515.484	-0.869
• services	D_{ser}	565	568.220	0.570
Domestic absorption				
• agriculture	Q_{agr}	360	356.015	-1.107
• manufacturing	Q_{man}	1300	1299.522	-0.037
• services	Q_{ser}	570	573.234	0.567
INTERNATIONAL TRADE				
Imports				
• agriculture	IM_{agr}	50	48.648	-2.705
• manufacturing	IM_{man}	780	783.690	0.473
• services	IM_{ser}	5	5.018	0.363
Exports				
• agriculture	EX_{agr}	190	191.114	0.586
• manufacturing	EX_{man}	105	105.351	0.334
• services	EX_{ser}	35	35.564	1.612
Current account balance				
	CAB	-528	-528.000	0.000

감사합니다

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TERIMA KASIH

THANK YOU TAKK

謝 謝 ありがとう merci