

Model File

Generated by Python Framework

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1 Model Information

name: *Gali, Smets and Wouters model. Application to covid-19 lockdown economic forecast.*

file: */home/alexei/work/snowdrop/models/COVID19/gsw_model.yaml*

1.1 Endogenous Variables Values

a = 0.0, b = 0.0, c = 0.0, cf = 0.0, epinfma = 0.0, ewma = 0.0, g = 0.0, inve = 0.0, invecf = 0.0, k = 0.0, kf = 0.0, kp = 0.0, kpf = 0.0, lab = 0.0, labf = 0.0, labstar = 0.0, lam = 0.0, lamf = 0.0, ls = 0.0, mc = 0.0, ms = 0.0, pinf = 0.0, pk = 0.0, pkf = 0.0, qs = 0.0, r = 0.0, rk = 0.0, rkf = 0.0, rrf = 0.0, spinf = 0.0, sw = 0.0, u = 0.0, unempl = 0.0, w = 0.0, wf = 0.0, winf = 0.0, x = 0.0, xf = 0.0, y = 0.0, yf = 0.0, ygap = 0.0, z = 0.0, zcap = 0.0, zcapf = 0.0, zf = 0.0

1.2 Measurement Variables

OBS_c, OBS_inve, OBS_pinf, OBS_r, OBS_unempl, OBS_y

1.3 Parameters

calfa = 0.17, cbetabar = 1.00, cchi = 0.10, ccy = 0.65, cfc = 1.50, cg = 0.18, cgamma = 1.00, cgy = 0.51, chabb = 0.75, cikbar = 0.03, cindp = 0.49, cindw = 0.18, ciy = 0.17, cla = 0.00, clandaw = 1.50, cmap = 0.00, cmaw = 0.00, cprobp = 0.62, cprobw = 0.55, crdy = 0.25, crhoa = 0.98, crhoas = 1.00, crhob = 0.42, crhog = 0.97, crhols = 0.00, crhoms = 0.00, crhopinf = 0.00, crhoqs = 0.75, crhow = 0.00, crk = 0.03, crkky = 0.17, crpi = 1.89, crr = 0.86, cry = 0.16, csadjcost = 0.20, csigl = 4.35, csigma = 1.00, ctou = 0.03, curvp = 10.00, curvw = 10.00, czcap = 0.56

1.4 Shocks

ea, eb, eg, els, em, epinf, eqs, ew, ey

1.5 Measurement Shocks

RES_OBS_y, RES_OBS_unempl, RES_OBS_pinf, RES_OBS_c, RES_OBS_r,
RES_OBS_inve

1.6 Equations

- 1 : $0 = \text{calfa} * \text{rkf} + (1 - \text{calfa}) * (\text{wf}) - \text{a}$
- 2 : $\text{zcapf} = (1 / (\text{czcap} / (1 - \text{czcap}))) * \text{rkf}$
- 3 : $\text{rkf} = \text{wf} + \text{labf} - \text{kf}$
- 4 : $\text{kf} = \text{kpf}(-1) + \text{zcapf}$
- 5 : $\text{invef} = (1 / (1 + \text{cbetabar} * \text{cgamma})) * (\text{invef}(-1) + \text{cbetabar} * \text{cgamma} * \text{invef}(1) + (1 / (\text{cgamma}^2 * \text{csadjcost})) * \text{pkf}) + \text{qs}$
- 6 : $\text{pkf} = -\text{rrf} + \text{b} + (\text{crk} / (\text{crk} + (1 - \text{ctou}))) * \text{rkf}(1) + ((1 - \text{ctou}) / (\text{crk} + (1 - \text{ctou}))) * \text{pkf}(1)$
- 7 : $\text{lamf} = \text{lamf}(+1) + (\text{rrf} - \text{b})$
- 8 : $\text{lamf} = -\text{csigma} / (1 - \text{chabb} / \text{cgamma}) * \text{cf} + \text{csigma} * (\text{chabb} / \text{cgamma}) / (1 - \text{chabb} / \text{cgamma}) * \text{cf}(-1)$
- 9 : $\text{yf} = \text{ccy} * \text{cf} + \text{ciy} * \text{invef} + \text{g} + \text{crkky} * \text{zcapf} + \text{ey}$
- 10 : $\text{kf} = (\text{yf} / \text{cfc} - (1 - \text{calfa}) * \text{labf} - \text{a}) / \text{calfa}$
- 11 : $\text{wf} = \text{csigl} * \text{labf} - \text{lamf} + \text{ls} + \text{xf}$
- 12 : $\text{kpf} = (1 - \text{cikbar}) * \text{kpf}(-1) + (\text{cikbar}) * \text{invef} + (\text{cikbar}) * (\text{cgamma}^2 * \text{csadjcost}) * \text{qs}$
- 13 : $\text{xf} = \text{zf} - 1 / (1 - \text{chabb} / \text{cgamma}) * \text{cf} + (\text{chabb} / \text{cgamma}) / (1 - \text{chabb} / \text{cgamma}) * \text{cf}(-1)$
- 14 : $\text{zf} = (1 - \text{cchi}) * \text{zf}(-1) + \text{cchi} / (1 - \text{chabb} / \text{cgamma}) * \text{cf} - \text{cchi} * (\text{chabb} / \text{cgamma}) / (1 - \text{chabb} / \text{cgamma}) * \text{cf}(-1)$
- 15 : $\text{mc} = \text{calfa} * \text{rk} + (1 - \text{calfa}) * (\text{w}) - 1 * \text{a}$
- 16 : $\text{zcap} = (1 / (\text{czcap} / (1 - \text{czcap}))) * \text{rk}$
- 17 : $\text{lab} = \text{rk} - \text{w} + \text{k}$

$$18 : k = kp(-1) + zcap$$

$$19 : inve = (1/(1 + cbetabar * cgamma))^* (inve(-1) + cbetabar * cgamma * inve(1) + (1/(cgamma^2 * csadjcost))^* pk) + qs$$

$$20 : pk = -r + pinf(1) + b + (crk/(crk + (1 - ctou))) * rk(1) + ((1 - ctou)/(crk + (1 - ctou))) * pk(1)$$

$$21 : lam = lam(+1) + (r - pinf(+1) - b)$$

$$22 : lam = -csigma/(1 - chabb/cgamma)^*c + csigma*(chabb/cgamma)/(1 - chabb/cgamma)^*c(-1)$$

$$23 : y = ccy*c + ciy*inve + g + crkky*zcaps + ey$$

$$24 : k = (y/cfc - (1 - calfa)*lab - a)/calfa$$

$$25 : w = (w(-1) - pinf + (cbetabar * cgamma)^*(w(1) + pinf(1)) + (cindw)*pinf(-1) - (cbetabar * cgamma * cindw)*pinf + (1 - cprobw)^*(1 - cbetabar * cgamma * cprobw)/(cprobw*(1 + (clandaw/(clandaw + 1))^*csigl))^*(csigl*unempl + 100*sw))/(1 + cbetabar * cgamma)$$

$$26 : kp = (1 - cikbar)*kp(-1) + cikbar*inve + cikbar * cgamma^2 * csadjcost * qs$$

$$27 : x = z - 1/(1 - chabb/cgamma)^*c + (chabb/cgamma)/(1 - chabb/cgamma)^*c(-1)$$

$$28 : z = (1 - cchi)*z(-1) + cchi/(1 - chabb/cgamma)^*c - cchi*(chabb/cgamma)/(1 - chabb/cgamma)^*c(-1)$$

$$29 : pinf = (1/(1 + cbetabar * cgamma * cindp)) * (cbetabar * cgamma * pinf(1) + cindp * pinf(-1) + ((1 - cprobp)^*(1 - cbetabar * cgamma * cprobp)/cprobp)/((cfc - 1)^*curvp + 1)*(mc + 100*spinf) + 0*spinf$$

$$30 : r = crpi*(1 - crr)*pinf + cry*(1 - crr)*(y - yf) + crdy*(y - yf - y(-1) + yf(-1)) + crr*r(-1) + ms$$

$$31 : a = crhoa*a(-1) + ea$$

$$32 : b = crhob*b(-1) + eb$$

$$33 : g = crhog*(g(-1)) + eg + cgy*ea$$

$$34 : qs = crhoqs*qs(-1) + eqs$$

$$35 : ms = crhoms*ms(-1) + em$$

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36 : spinf = crhopinf*spinf(-1) + epinfma - cmap*epinfma(-1)

37 : epinfma = epinf

38 : sw = crhow*sw(-1) + ewma - cmaw*ewma(-1)

39 : ewma = ew

40 : u = labstar - lab

41 : ls = 0*ls(-1) + els + cla*ea

42 : w = csigl*labstar - lam + ls + x

43 : winf = w-w(-1)+pinf

44 : ygap = y-yf

45 : u = -unempl

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1.7 Measurement Equations

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1 : OBS_y = y + RES_OBS_y

2 : OBS_unempl = unempl + RES_OBS_unempl

3 : OBS_pinf = pinf + RES_OBS_pinf

4 : OBS_c = c + RES_OBS_c

5 : OBS_r = r + RES_OBS_r

6 : OBS_inve = inve + RES_OBS_inve

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1.8 Legend

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b -- Risk Premium Shock Process
c -- Consumption
calfa -- Contribution of Capital in Production Function
cf -- Consumption Flex Price Economy
cfc -- Fixed Cost Share
cg -- Steady State Exogenous Spending Share
cgamma -- Gross Growth Rate
cgy -- Coefficient of Government Expenditure Shock

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chabb -- External Habit Degree
 cindp -- Indexation to Past Prices
 cindw -- Indexation to Past Wages
 clandaw -- Gross Markup Wages
 cmap -- Coefficient on MA Term Price Markup
 cmaw -- Coefficient on MA Term Wage Markup
 cprobp -- Calvo Parameter Prices
 cprobw -- Calvo Parameter Wages
 crdy -- Taylor Rule Output Growth Feedback
 crhoa -- Persistence Productivity Shock
 crhob -- Persistence Risk Premium Shock
 crhog -- Persistence Spending Shock
 crhoms -- Persistence Monetary Policy Shock
 crhopinf -- Persistence Price Markup Shock
 crhoqs -- Persistence Risk Premium Shock
 crhow -- Persistence Wage Markup Shock
 crpi -- Taylor Rule Inflation Feedback
 crr -- Interest Rate Persistence
 cry -- Taylor Rule Output Level Feedback
 csadjcost -- Investment Adjustment Cost
 csigl -- Frisch Elasticity
 csigma -- Risk Aversion
 ctou -- Depreciation Rate
 ctrend -- Net Growth Rate in Percent
 czcap -- Capacity Utilization Cost
 ey -- Shock to Output
 g -- Government Expenditure
 inve -- Investment
 inve(-1) -- Lag of Investment
 inve(1) -- Lead of Investment
 k -- Capital
 k(-1) -- Lag of Capital
 k(1) -- Lead of Capital
 kpf -- Capital Stock Flex Price Economy
 kpf(-1) -- Lag of Capital Stock Flex Price Economy
 kpf(1) -- Lead of Capital Stock Flex Price Economy
 lab -- Hours worked
 labf -- Hours Worked Flex Price Economy
 labstar -- Labor Supply
 mc -- Gross Price Markup
 ms -- Monetary Policy Shock Process
 pinf -- Inflation
 pinf(-1) -- Lag of Inflation
 pinf(1) -- Lead of Inflation
 pk -- Capital Stock
 pk(-1) -- Lag of Capital Stock

pk(1) -- Lead of Capital Stock
 qs -- Investment-Specific Technology
 r -- Nominal Policy Rate
 r(-1) -- Lag of Nominal Policy Rate
 r(1) -- Lead of Nominal Policy Rate
 rk -- Real Rental Rate on Capital
 spinf -- Price Markup Shock Process
 sw -- Wage Markup Shock Process
 u -- Minus Unemployment Rate
 unempl -- Unemployment Rate
 w -- Wage Rate
 w(-1) -- Lag of Wage Rate
 w(1) -- Lead of Wage Rate
 y -- Output
 y(-1) -- Lag of Output
 y(1) -- Lead of Output
 yf -- Natural (Flex-Price) Output
 yf(-1) -- Lag of Natural Output
 yf(1) -- Lead of Natural Output
 ygap -- Output Gap
 z -- Trend for aggregate consumption
 zcap -- Capital Utilization Rate
 zf -- Trend for aggregate consumption Flex Price Economy