

Only one shock (technology shock, eps_a)

THEORETICAL MOMENTS

VARIABLE	MEAN	STD. DEV.	VARIANCE
ppi_h	0.0000	0.3296	0.1086
ppi	0.0000	0.1714	0.0294
ygap	0.0000	0.8089	0.6543
q	0.0000	0.4476	0.2003
e_d	0.0000	0.0000	0.0000
r	0.0000	0.0000	0.0000
r_r	0.0000	0.1714	0.0294
y	0.0000	0.6283	0.3948
y_os	0.0000	0.0000	0.0000
mc	0.0000	3.4539	11.9292
mc_os	0.0000	0.0000	0.0000
ppi_os	0.0000	0.0000	0.0000
r_os	0.0000	0.0000	0.0000
a	0.0000	1.4003	1.9608
a_os	0.0000	0.0000	0.0000
g	0.0000	0.0000	0.0000
rnat	0.0000	0.5256	0.2763

All shocks

THEORETICAL MOMENTS

VARIABLE	MEAN	STD. DEV.	VARIANCE
ppi_h	0.0000	2.3335	5.4452
ppi	0.0000	1.8134	3.2884
ygap	0.0000	4.5327	20.5450
q	0.0000	3.9917	15.9334
e_d	0.0000	0.0000	0.0000
r	0.0000	2.8806	8.2979
r_r	0.0000	1.8498	3.4217
y	0.0000	4.5966	21.1286
y_os	0.0000	5.1566	26.5908
mc	0.0000	19.3538	374.5707
mc_os	0.0000	20.4392	417.7591
ppi_os	0.0000	1.9282	3.7181
r_os	0.0000	2.8806	8.2979
a	0.0000	1.4003	1.9608
a_os	0.0000	2.2942	5.2632
g	0.0000	6.1728	38.1039
rnat	0.0000	0.6103	0.3724

Variance decomposition having all but one shock in the shocks section (all but one commented out)

VARIANCE DECOMPOSITION (in percent)							
	eps_g	eps_g_os	eps_a	eps_a_os	eps_u	eps_v	eps_u_os
ppi_h	0.00	0.00	100.00	0.00	0.00	0.00	0.00
ppi	0.00	0.00	100.00	0.00	0.00	0.00	0.00
ygap	0.00	0.00	100.00	0.00	0.00	0.00	0.00
q	0.00	0.00	100.00	0.00	0.00	0.00	0.00
e_d	0.00	0.00	100.00	0.00	0.00	0.00	0.00
r	0.00	0.23	0.00	5.15	0.00	1.84	92.79
r_r	0.00	0.00	100.00	0.00	0.00	0.00	0.00
y	0.00	0.00	100.00	0.00	0.00	0.00	0.00
y_os	0.00	0.17	0.00	13.53	0.00	3.26	83.04
mc	0.00	0.00	100.00	0.00	0.00	0.00	0.00
mc_os	0.00	0.02	0.00	0.12	0.00	3.78	96.08
ppi_os	0.00	0.22	0.00	4.90	0.00	6.53	88.36
r_os	0.00	0.23	0.00	5.15	0.00	1.84	92.79
a	0.00	0.00	100.00	0.00	0.00	0.00	0.00
a_os	0.00	0.00	0.00	100.00	0.00	0.00	0.00

Variance decomposition having all shocks in the shocks section (no one commented out)

VARIANCE DECOMPOSITION (in percent)							
	eps_g	eps_g_os	eps_a	eps_a_os	eps_u	eps_v	eps_u_os
ppi_h	1.51	0.00	1.99	4.19	45.11	0.76	46.43
ppi	0.68	0.00	0.89	4.79	20.20	1.25	72.19
ygap	1.79	0.00	3.18	2.36	68.07	0.70	23.90
q	1.49	0.00	1.26	8.17	44.54	0.00	44.54
e_d	39.70	0.00	1.73	1.76	33.49	0.19	23.14
r	0.00	0.00	0.00	5.24	0.00	0.30	94.46
r_r	0.65	0.00	0.86	4.50	19.41	3.80	70.79
y	5.73	0.00	1.87	2.29	66.19	0.68	23.24
y_os	0.00	0.00	0.00	13.94	0.00	0.54	85.53
mc	1.79	0.00	3.18	2.36	68.07	0.70	23.90
mc_os	0.00	0.00	0.00	0.13	0.00	0.62	99.25
ppi_os	0.00	0.00	0.00	5.20	0.00	1.11	93.70
r_os	0.00	0.00	0.00	5.24	0.00	0.30	94.46
a	0.00	0.00	100.00	0.00	0.00	0.00	0.00
a_os	0.00	0.00	0.00	100.00	0.00	0.00	0.00
g	100.00	0.00	0.00	0.00	0.00	0.00	0.00
rnat	25.82	0.00	74.18	0.00	0.00	0.00	0.00

Code:

```
// Baseline Dynare

// Define variables and parameters
var ppi_h ppi ygap q e_d r r_r y y_os mc mc_os ppi_os r_os a a_os g rnat
yflex c c_os s e nx u u_os v ygap_os rnat_os yflex_os r_s p_h cpi_level g_os;
varexo eps_g eps_g_os eps_a eps_a_os eps_u eps_v eps_u_os;

parameters beta sigma sigma_a alpha eta epsilon phi phi_os kappa_y theta
theta_os gamma gamma_os kappa_os omega_a lambda lambda_os rho_g rho_a
rho_a_os rho_u rho_u_os rho_v a_shock_correl u_shock_correl rho_g_os g_shock_correl;

// Euro Area Calibration (Similar to Danish Calibration in symmetric case)
beta = 0.995; // Household Discount factor - Same as in DK due to (32)
sigma = 1; // Degree of risk aversion - Same as in DK due to (32)
phi_os = 2.9; // Labour disutility parameter
theta_os = 0.78; // Calvo probability
gamma_os = 0.27; // G to GDP share
lambda_os = (1-(beta*theta_os))*(1-theta_os)/theta_os; // See note to (55)
kappa_os = lambda_os*(phi_os + (sigma/(1-gamma_os))); // See note to (55)

// Danish Economy Calibration
//beta = 0.995; // Household Discount factor
//sigma = 2; // Degree of risk aversion
alpha = 0.48; // Degree of 'openness' (Imports to GDP share)
eta = 1; // Elast. of sub. between domestic and foreign goods
```

```

epsilon = 6.0; // Elast. Between variety of goods
phi = 2.9; // Labour disutility parameter
theta = 0.78; // Calvo parameter (domestic price)
gamma = 0.27; // Government to GDP share
omega_a = 1 + alpha*(2-alpha)*(sigma*eta - 1); // See note to (45)
lambda = (1-(beta*theta))*(1-theta)/theta; // See note to (48)
sigma_a = sigma / omega_a; // See note to (46)
kappa_y = lambda*(phi + (sigma_a/(1-gamma))); // See note to (55)

// Persistence parameters of the structural shocks
rho_a = 0.7;
rho_a_os = 0.9;
a_shock_correl = 0.0;
u_shock_correl = 0.0;
g_shock_correl = 0.0;
rho_g = 0.8;
rho_g_os = 0.8;
rho_u = 0.8;
rho_u_os = 0.8;
rho_v = 0.5;

model(linear);

// The Euro Area Economy
// Euro Area DIS curve
ygap_os = ygap_os(+1) - ((1-gamma_os)/sigma)*(r_os - ppi_os(+1) - rnat_os);

```

// Euro Area NKPC

$$\text{ppi_os} = \beta * \text{ppi_os}(+1) + \kappa_{\text{os}} * \text{ygap_os} + u_{\text{os}};$$

// Euro Area Natural Output

$$\text{yflex_os} = (1 + \phi_{\text{os}}) / (\phi_{\text{os}} + (\sigma / (1 - \gamma_{\text{os}}))) * a_{\text{os}} +$$

$$(\sigma * \gamma_{\text{os}}) / (\phi_{\text{os}} * (1 - \gamma_{\text{os}}) + \sigma) * g_{\text{os}};$$

// Euro Area Output

$$y_{\text{os}} = \text{yflex_os} + \text{ygap_os};$$

// Euro Area Market Clearing

$$y_{\text{os}} = \gamma_{\text{os}} * g_{\text{os}} + (1 - \gamma_{\text{os}}) * c_{\text{os}};$$

// Euro Area Natural Real Rate

$$\text{rnat_os} = (\sigma * \phi_{\text{os}} * \gamma_{\text{os}}) * (1 - \rho_{\text{g_os}}) / (\sigma + \phi_{\text{os}} * (1 -$$

$$\gamma_{\text{os}})) * g_{\text{os}} - (\sigma * (1 + \phi_{\text{os}}) * (1 - \rho_{\text{a_os}})) / (\sigma + \phi_{\text{os}} * (1 -$$

$$\gamma_{\text{os}})) * a_{\text{os}};$$

// Euro Area MC

$$\text{mc_os} = (\sigma / (1 - \gamma_{\text{os}}) + \phi_{\text{os}}) * \text{ygap_os};$$

// ECB monetary policy Rule

$$r_{\text{os}} = 1.5 * \text{ppi_os} + v;$$

```
// Euro Area Shocks
```

```
// Euro fiscal AR(1) process
```

```
g_os = rho_g_os*g_os(-1) + eps_g_os; // ligning tilføjet AMO ellers #VAR>#lign.
```

```
// ECB monetary shock AR(1)
```

```
v = rho_v*v(-1) + eps_v;
```

```
// Euro Area technology AR(1) process
```

```
a_os = rho_a_os*a_os(-1) + eps_a_os;
```

```
// Euro Area cost push shock
```

```
u_os = rho_u_os*u_os(-1) + eps_u_os;
```

```
// The Danish Economy \\
```

```
// Danish DIS curve
```

```
ygap = ygap(+1) - ((1-gamma)/sigma_a)*(r - ppi_h(+1) - rnat);
```

```
// Danish NKPC curve including cost push shock (specified below)
```

```
ppi_h = beta*ppi_h(+1) + kappa_y*ygap + u;
```

```
// Danish Natural Output
```

```
yflex = (1+phi)/(phi + (sigma_a/(1-gamma)))*a +  
(sigma_a*gamma)/(phi*(1-gamma)+sigma_a)*g -
```

```

(sigma-sigma_a)/(phi*(1-gamma)+sigma_a)*y_os +
((sigma-sigma_a)*gamma)/(phi*(1-gamma)+sigma_a)*g_os;

// Danish Output gap

y = yflex + ygap;

// DK Market clearing;

y = gamma*g + y_os - gamma*g_os + (1-gamma)*(omega_a/sigma)*s;

// Danish Natural real rate

rnat = phi*(sigma-sigma_a)/(phi*(1-gamma)+sigma_a)*(y_os(+1) - y_os)
+ (sigma_a*gamma*phi*(1-rho_g))/(phi*(1-gamma)+sigma_a)*g
+ (sigma-sigma_a)*gamma*phi*(1-rho_g_os)/(phi*(1-gamma)+sigma_a)*g_os
- (1+phi)*sigma_a*(1-rho_a)/(phi*(1-gamma)+sigma_a)*a;

// Danish MC

mc = ((sigma_a)/(1-gamma)+phi)*ygap;

// Danish Consumption

c = c_os + ((1-alpha)/sigma)*s;

// Danish Net Exports

nx = (1-gamma)*alpha*s*(((sigma*eta+(1-alpha)*(sigma*eta-1))/sigma)-1);

// Danish CPI inflation

ppi = ppi_h + alpha*(s - s(-1));

// Danish real exchange rate (13)

q = (1-alpha)*s;

// Danish real interest rate

r_r = r - ppi;

```

```

// Interest rate differential
r_s = r - r_os;

// Danish Terms of trade equation
s - s(-1) = e - e(-1) + ppi_os - ppi_h;

// Depreciation rate of nominal exchange rate
e_d = e - e(-1);

// An identity to pin down the relative price of home goods
p_h = p_h(-1) + ppi_h;

// An identity to pin down the consumer price level
cpi_level = cpi_level(-1) + ppi;

// Danish Shocks

// Danish fiscal AR(1) process
g = rho_g*g(-1) + eps_g + g_shock_correl*eps_g_os;

// Danish technology AR(1) process
a = rho_a*a(-1) + eps_a + a_shock_correl*eps_a_os;

// Cost push shock (Price markup shock) AR(1) process
u = rho_u*u(-1) + eps_u + u_shock_correl*eps_u_os;

// Exchange Rate Regimes (comment out all but one) \\
e = 0; // PEG

// r = 1.5*ppi; // SIT

// r = 1.5*ppi + 0.125*ygap; // FIT

// r = 1.5*ppi(+1) + 0.125*ygap; // IFT

// r = 1.5*ppi + 0.125*ygap + 0.15*(e - e(-1)); // DF

```

```
// r = 1*ppi + 0.25*ygap; // NGDP (NGDP)
end;

// Shocks (comment out all but one) \\
shocks;
var eps_a; stderr 1.00; // DK tech shock
// var eps_u; stderr 1; // DK cost push shock
// var eps_g; stderr (100/27); // DK fiscal shock
// var eps_a_os; stderr 1; // Eura Area tech shock
// var eps_v; stderr 0.4; // Euro Area monetary policy shock
// var eps_u_os; stderr 1; // Euro Area monetary policy shock
end;

check;

stoch_simul (order=1, irf=20);
//stoch_simul (periods=500, order=1, irf=500);
```