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Small Open Economy Model with Domestic Resource Shocks: Monetary Union vs. Floating Exchange Rate

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Monetary Union: For and Against

For:

- Reduced transaction costs

- Elimination of exchange rate risk

- Prices more transparent across countries

Against:

- Loss of a degree of freedom: the exchange rate,

    $\implies$ reduced ability to absorb adverse macroeconomic shocks

- Surrender of national sovereignty

Related Literature

Indirect comparison

- Buiter (MPI, 2000):   Neither regime owerwhelmingly dominates the other

- Gudmundsson et.al. (MPI,2000):   Rather in favour of flexible rates

- Agnarsson et.al. (MPI 2000):   EMU would limit the economy's ability to absorb adverse supply shocks

Direct comparison

- Mendoza (JMCB 2001):   Dollarization of Mexico could improve welfare:

    (i) elimination of price and wealth distortions
    (ii) improved efficiency of financial markets

- Schmitt-Grohé & Uribe (JMCB 2001):   Dollarization is marginally Pareto inferior to floating rates + constant money growth or inflation targeting:

    - 'sticky' prices of nontradeables

The Model

Households

$$\max_{\{c_{Dt},c_{Ft},l_t,n_t,k_{t+1}^d,b_{t+1}^d,M_{t+1}^d\}} \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t U(c_{Dt},c_{Ft},l_t), \quad \beta \in (0,1) \tag{1}$$

Budget constraint

$$P_t c_{Dt} + E_t c_{Ft} + P_t[k_{t+1}^d - (1-\delta)k_t^d] + E_t b_{t+1}^d + M_{t+1}^d$$

$$\leq P_t R_t k_t^d + W_t n_t + R_{Ft} E_t b_t^d + M_t^d + \phi J_t, \quad \phi \in \{0,1\} \tag{2}$$

Cash-in-advance constraint

$$P_t c_{Dt} + E_t c_{Ft} \leq M_t^d + A_t \tag{3}$$

Time constraint

$$l_t + n_t \leq 1 \tag{4}$$

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Euler equations

$$U_l/w = \beta \ \mathrm{E}\Big\{[R' + (1-\delta)]U_l'/w'\Big\} \tag{5}$$

$$U_l/w = \beta \ \mathrm{E}\Big\{[R_F{}'(e'/e)]U_l'/w'\Big\} \tag{6}$$

$$U_l/w = \beta \ \mathrm{E}\Big\{U_{cD}{}'/\pi'\Big\} \tag{7}$$

$$U_{cF}/U_{cd} = e \tag{8}$$

Firms

$$\max_{K,N} \{F[K, N, H(\theta_D), \theta_G] - RK - wN\} \tag{9}$$

F.O.C.

$$F_K = R \tag{10}$$

$$F_N = w \tag{11}$$

The monetary authority

Monetary policy rule (floating exchange rate):

$$M_{t+1} = \mu(S)M_t \tag{12}$$

Under floating, any increment to the money stock is passed on to households as a transfer:

$$M_{t+1} = M_t + J_t$$

The balance of payments

$$V_t = P_t X(\theta_{Ft}, e_t) + E_t H(\theta_{Dt}) - E_t c_{Ft} + R_{Ft} E_t b_t - E_t b_{t+1}, \tag{13}$$
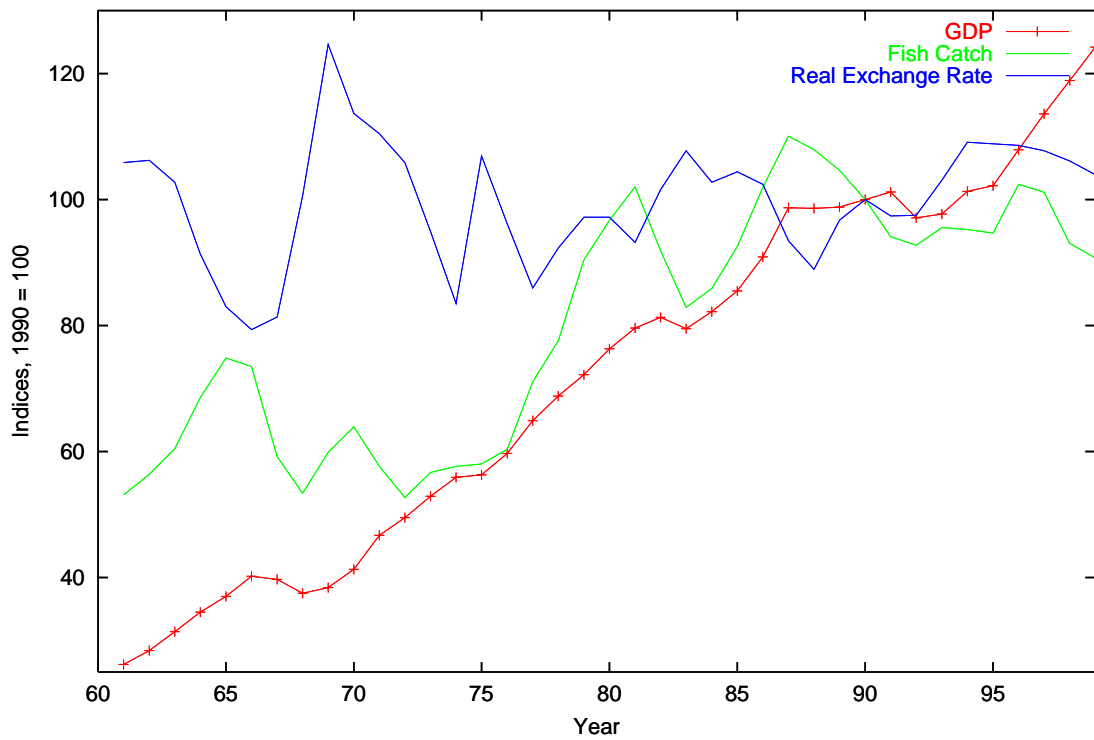
Figure 1: GDP, Fish Catch, and the Real Exchange Rate

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Table 1

Summary of Second Moments

		Icelandic data						
	1961 - 99		1961 - 79		1980 - 99		1988 - 99	
Variable	stdev	corr w/y	stdev	corr w/y	stdev	corr w/y	stdev	corr w/y
y	4.21	1.00	4.81	1.00	3.50	1.00	3.20	1.00
c	4.57	0.89	4.85	0.92	4.30	0.92	4.02	0.89
i	12.31	0.80	13.80	0.79	11.17	0.85	13.29	0.90
n	1.97	0.54	1.12	0.41	2.64	0.85	2.05	0.95
w^c	7.71	0.88	8.28	0.89	7.05	0.83	4.60	0.82
e	8.68	-0.75	11.54	-0.82	4.58	-0.68	3.22	-0.51
u/y	3.16	-0.20	3.82	-0.14	2.26	-0.47	2.27	-0.75
eb'/y	4.86	-0.77	4.99	-0.80	4.65	-0.65	3.01	-0.67

Notes: All data are HP-filtered, setting the smoothing parameter to 100. The series on private consumption excludes expenditures on durables; investment includes public works and buildings; w^c denotes the real wage in terms of the coposite consumption good; and u net exports. Data source: National Economic Institute

Icelandic Business Cycle Data: Main Characteristics

- Output volatility relatively large, but decreasing

- Consumption more volatile than output

- Investment/Output volatility fairly typical

- Employment relatively smooth, but decreasingly so

- Real exchange rate strongly countercyclical

- Net exports countercyclical, typical

Table 2

Summary of Second Moments

| | Icelandic data | | Model | | | |
| | 1988 - 99 | | Floating | | Monetary union | |
Variable	stdev	corr w/y	stdev	corr w/y	stdev	corr w/y
y	3.20	1.00	3.27	1.00	3.48	1.00
c	4.02	0.89	3.05	0.82	1.60	0.83
i	13.29	0.90	14.01	0.95	11.36	0.95
n	2.05	0.95	2.29	0.91	2.55	0.94
w^c	4.60	0.82	2.56	0.83	1.35	0.83
e	3.22	-0.51	4.27	-0.51	1.86	-0.03
u/y	2.27	-0.75	0.77	-0.81	0.69	0.36
eb'/y	3.01	-0.67	2.97	-0.73	1.25	-0.81

Notes: All data are HP-filtered, setting the smoothing parameter to 100. w^c denotes the real wage in terms of the coposite consumption good; u net exports.

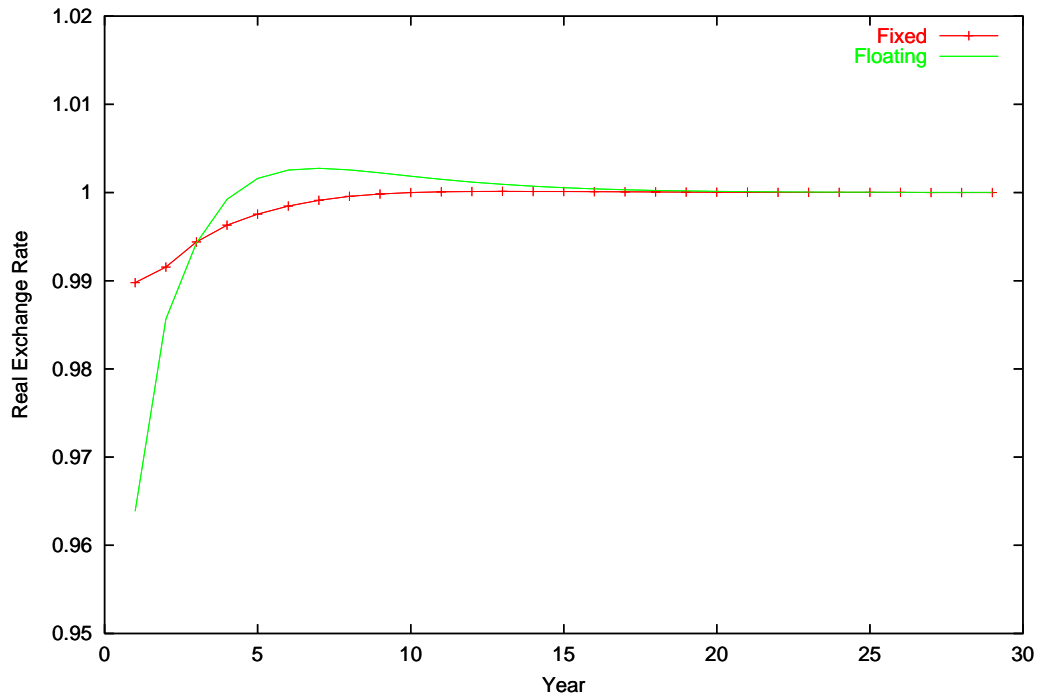Figure 2: Imp. Res., Domestic Resource Shock
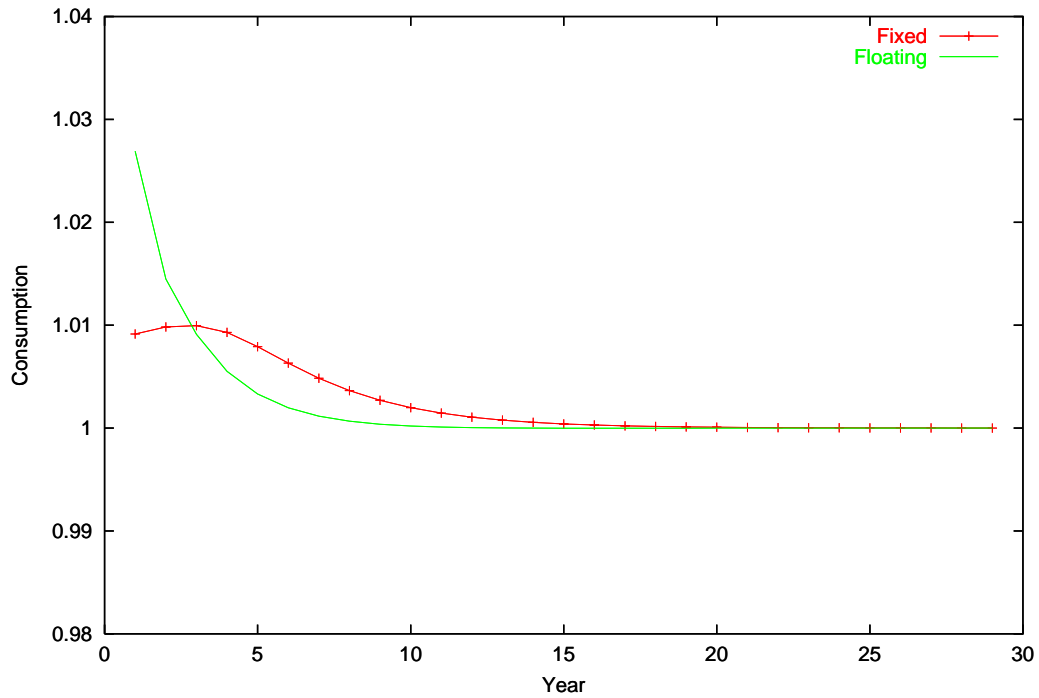

Figure 3: Imp. Res., Domestic Resource Shock
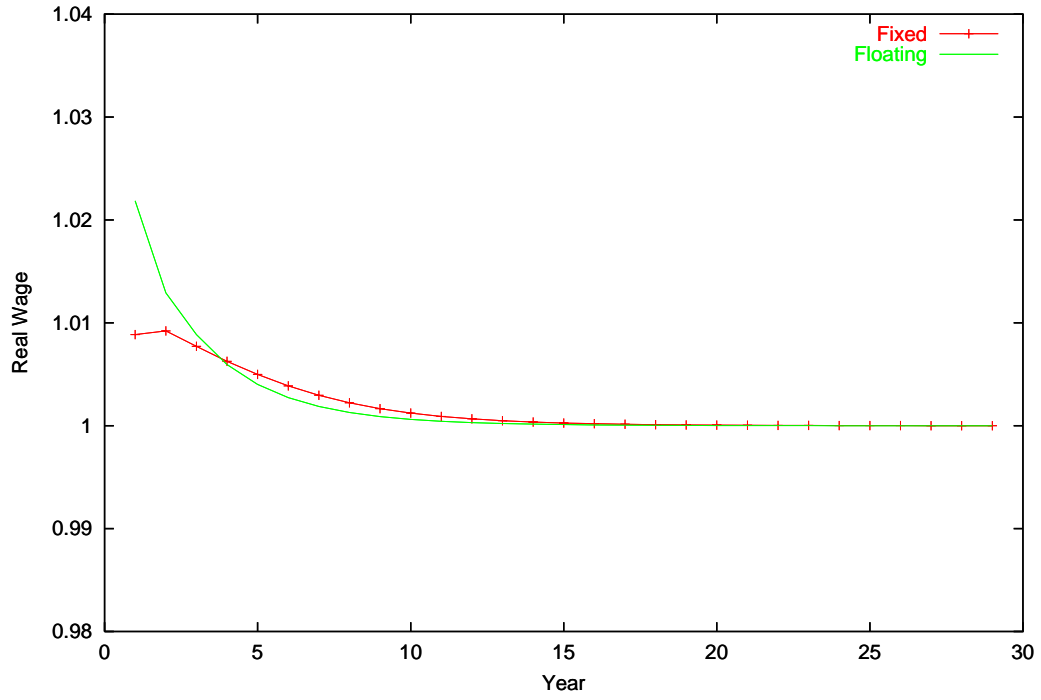
Figure 4: Imp. Res., Domestic Resource Shock

Figure 5: Imp. Res., Domestic Resource Shock
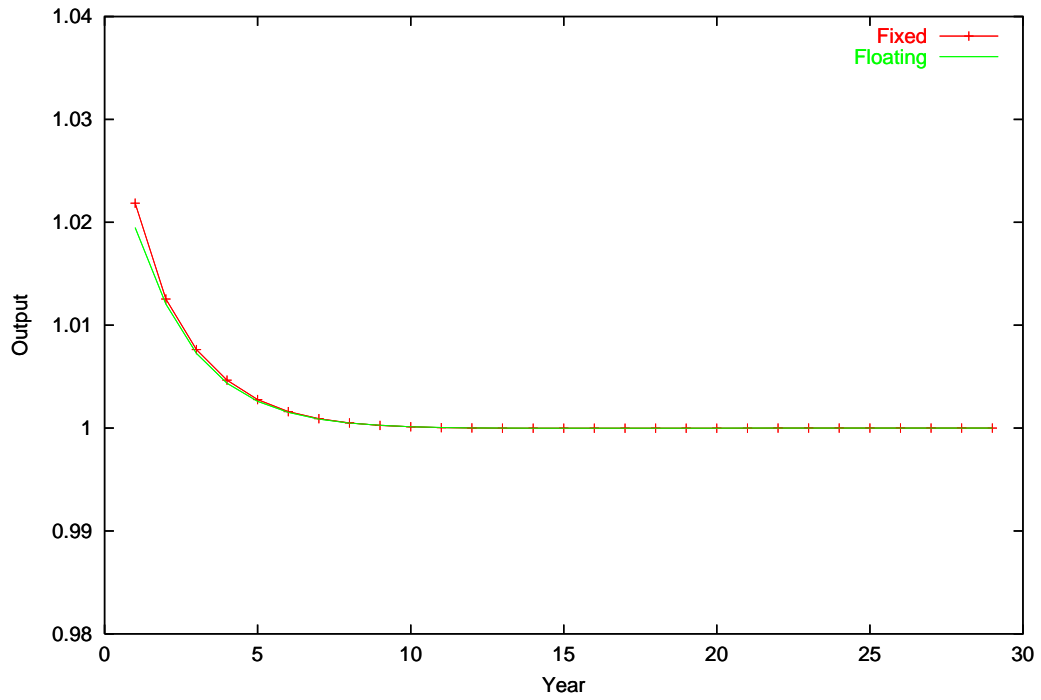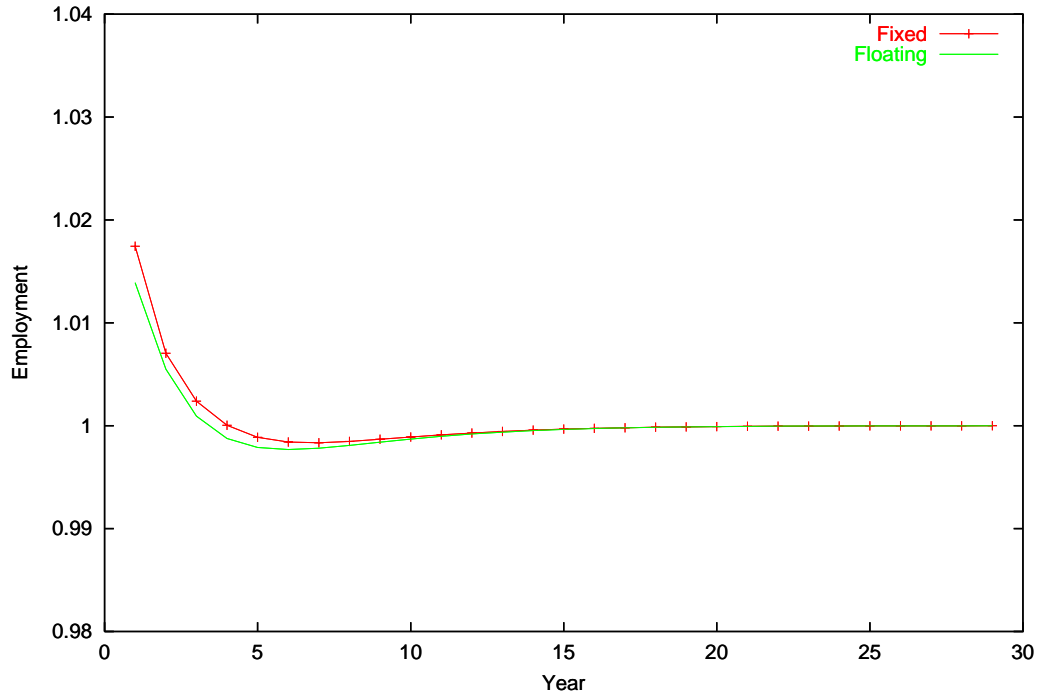
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Figure 6: Imp. Res., Domestic Resource Shock

Figure 7: Imp. Res., Domestic Resource Shock

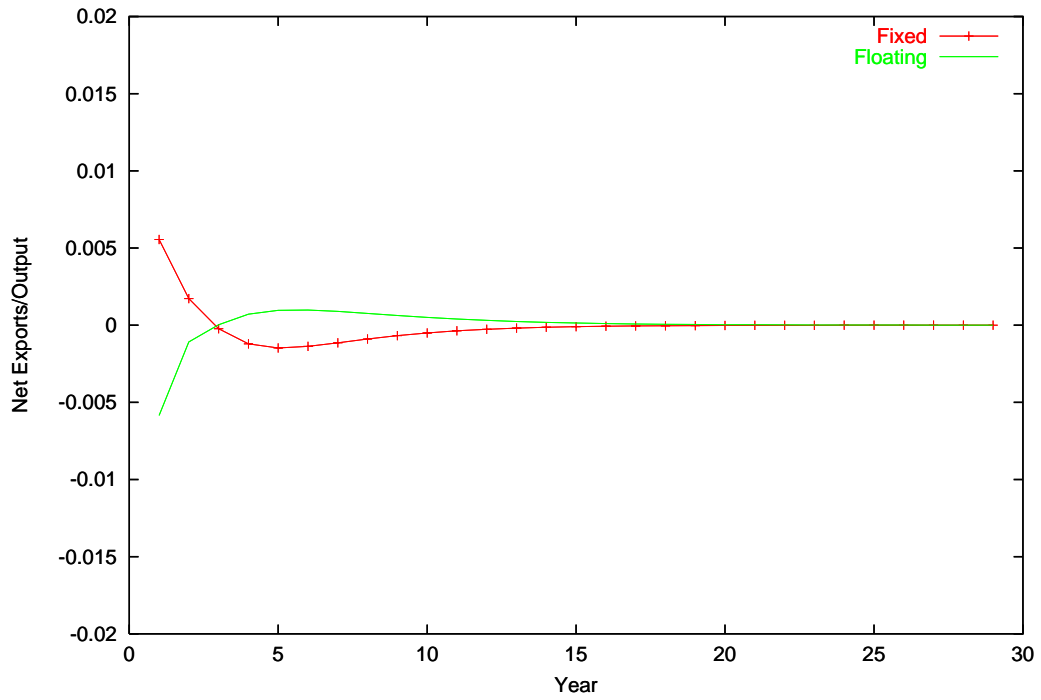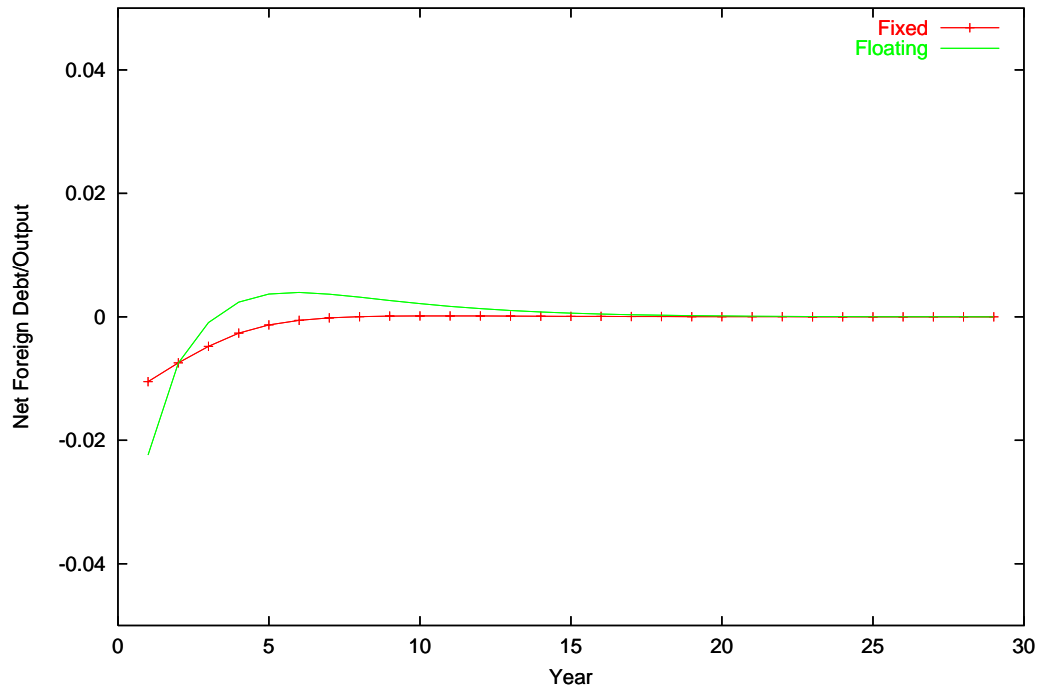14

Figure 8: Imp. Res., Domestic Resource Shock

4.3 Wage rigidity: a problem?

Table 3

Probabilty of $\Delta W < 0$, percent

π	1.02	1.04	1.10
Floating	1.7	< 0.1	< 0.1
Monetary union	15.8	1.5	< 0.1

4.4 Welfare calculus

Compensating variation

$$\mathrm{E}\left[U(\nu c_D, \nu c_F, l)\right] = U(\bar{c}_D, \bar{c}_F, \bar{l})$$

Approximation

$$\nu - 1 = \frac{1}{2}\mathrm{Var}(c_D) + \frac{\eta_1}{2}\mathrm{Var}(c_F)$$

Table 4

Welfare costs of Icelandic business cycles

Regime	Welfare cost
Floating	0.13
Monetary union	0.03