Revisiting the Asian Currency Crisis in South Korea: A Counterfactual Analysis using a Regime-Switching DSGE Model

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April 04, 2025

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1. Introduction

Overview of the 1997 Asian currency crisis in South Korea

- high external debt
  - leverage ratio (manufacturing): 396.3% in 1997
  - Debt/GDP ratio: 183.9% in 1998 Q1
- weak financial and corporate sectors
  - collapses of big corporations: Hanbo Steel, Sammi Steel, Jinro group, Dainong and New Core group, Kia, etc.
- Current Account Deficit/GDP ratio: 4% in 1996
- fixed exchange rates and speculative attacks on currencies
  Oct. 20, 1997: allow 10% upper and lower bound in the managed floating system
  Nov. 21, 1997: apply for the IMF rescue package
  Dec. 4, 1997: $55 bil rescue
  Dec. 16, 1997: abolish daily exchange rate band

Motivational Background

IMF intervention: Bailout package

- Exchange rate and monetary policy
- Financial and corporate sector reform
- Capital account and trade liberailization
- Labor market reforms and fiscal program (allow for automatic stabilizer)

Central Bank's perspective

- Interest rate hike (unsecured call rate(policy rate))
  - 23.93% in 1998 Q1
  - 27.15% on Dec. 30, 1997
- Change in exchange rate regime from managed floating to flexible in 1998

Research Questions

- Are there alternative measures that could have been less costly economically (and socially)?
  - counterfactuals
- What would have happened if certain measures were not implemented?
  - moderate monetary policy shock in 1998
- What could have been alternative approaches to crisis management?
  - devaluation instead of defending Korean Won in 1997
  - (*cf*) Taiwan's experience

Figure: Korea: Real GDP growth rate (source: BOK).
Taiwan: Real GDP growth rate in 2017 U.S. dollars (source: FRED, RGDPNATWA666NRUG).
This series extends only to 2019.

UNIFIED FRAMEWORK FOR THE ANALYSIS OF FINANCIAL CRISIS IN EMERGING ECONOMIES

- a medium-scale DSGE model with financial frictions
- Regime switching in the exchange rate system

$\Rightarrow$ from Managed floating to flexible rate system in 1998

- Regime switching in shock volatility: High vs. Low

COUNTERFACTUALS

- moderate monetary policy shock in 1998
- devaluation instead of defending Korean Won in Q3 1997

Review of Literature

Small open economy + Risk premium

- Gali and Monacelli (2005, RES), Schmidt-Grohe and Uribe (2003, JIE)

Financial frictions

- Gertler and Kiyotaki (2011, Handbook), Gertler and Karadi (2011, JME)

Exchage rate system + Taylor rule

- Batini et al. (2003, JEDC), Batini et al. (2010)

Asian Currency Crisis

- Kaminsky and Reinhart (1999, AER), Corsetti et al. (1999, EER), Burnside et al. (2001, JPE)

DSGE + Crisis

- Mimir and Sunel (2019, IJCB)

Regime switching DSGE

- Bianchi F. (2013, RES), Liu et al. (2011, QE)

Regime switching DSGE + Exchange rate system

- Curdia and Finocchiaro (2013, JEDC),

Regime switching DSGE + Crisis

- Benigno et al. (2025, QE)

2. The Regime-switching SOE DSGE Model

Two independent Markov-switching

- Regime switching in the exchange rate system

⇒ from Managed floating to flexible rate system in 1998

- Regime switching in shock volatility: High vs. Low

$$\max \mathbb{E}_t \sum_{i=0}^{\infty} \beta^i U(C_{t+i}, N_{t+i}) \tag{1}$$

subject to

$$P_{C,t} C_t + D_t = W_t N_t + R_{t-1} D_{t-1} + P_{C,t} \Pi_t \tag{2}$$

- Period utility function

$$U(C_t, N_t) = \frac{\varepsilon_{C,t} (C_t - hC_{t-1})^{1-\sigma_C} - 1}{1 - \sigma_C} - \kappa_N \frac{{N_t}^{1+\sigma_N}}{1 + \sigma_N} \tag{3}$$

- consumption index

$$C_t = \left[a_C^{\frac{1}{\eta}} C_{H,t}^{\frac{\eta-1}{\eta}} + (1-a_C)^{\frac{1}{\eta}} C_{F,t}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}, \quad \eta > 0 \tag{4}$$

- consumer price index

$$P_{C,t} = \left[a_C P_{H,t}^{1-\eta} + (1-a_C) P_{F,t}^{1-\eta} \right]^{\frac{1}{1-\eta}}, \ \eta > 0 \tag{5}$$

- Consumption demand for home and/or foreign goods

$$C_{H,t} = a_C \left[\frac{P_{H,t}}{P_{C,t}} \right]^{-\eta} C_t \tag{6}$$

$$C_{F,t} = (1-a_C) \left[\frac{P_{F,t}}{P_{C,t}} \right]^{-\eta} C_t \tag{7}$$

- Foreign demand for home goods

$$C_{H,t}^* = a_C^* \left(\frac{P_{H,t}^*}{P_t^*} \right)^{-\eta} C_t^* \tag{8}$$

- LOOP

$$P_{F,t} = S_t P_t^* \tag{9}$$

$$S_t P_{H,t}^* = P_{H,t} \tag{10}$$

- balance of payment

$$S_t B_{t+1}^F + P_{F,t} C_{F,t} = S_t P_{H,t}^* C_{H,t}^* + S_t R_{t-1}^F \Psi_{t-1} B_t^F \tag{11}$$

- risk premium: SGU (2003, JIE)

$$\Psi_t = \left(exp(\psi_R \frac{B_t^F - \bar{B}^F}{P_{H,t} Y_{H,t}}) \right) \psi_t \tag{12}$$

- CPI inf rate vs. Domestic price inf rate

$$\pi_{C,t} = \frac{P_{C,t}}{P_{C,t-1}}, \quad \pi_{H,t} = \frac{P_{H,t}}{P_{H,t-1}} \tag{13}$$

- bank balance sheet:

$$b_t = d_t + b_t^F + nw_t \tag{14}$$

where $b_t^F \equiv \frac{S_t B_{t+1}^F}{P_{C,t}}, \quad d_t \equiv \frac{D_t}{P_{C,t}}$.

- evolution of net worth:

$$nw_t = \frac{R_t^B b_{t-1}}{\pi_{C,t}} - \frac{R_{t-1} d_{t-1}}{\pi_{C,t}} - \frac{R_{t-1}^F b_{t-1}^F}{\pi_{C,t}} \tag{15}$$

- various real interest rates

$$r_t^B \equiv \frac{R_t^B}{\pi_{C,t}}, \quad r_t^F \equiv \Psi_{t-1}(R_{t-1}^F) \frac{S_t}{S_{t-1}} \frac{P_{C,t-1}}{P_{C,t}}, \quad r_t \equiv \frac{R_{t-1}}{\pi_{C,t}} \tag{16}$$

- Bank j max the expected terminal wealth:

$$V_{jt}(nw_t(j)) \quad = \quad max \ \ \mathbb{E}_t \left[\sum_{i=0}^{\infty} (1-\chi)\chi^i \beta^{i+1} \Lambda_{t,t+1+i} \ nw_{t+1+i}(j) \right] \tag{17}$$

s.t

$$nw_{t+1}(j) = \left(r_{t+1}^B - \frac{R_t}{\pi_{C,t+1}} \right) b_t + \left(\frac{R_t}{\pi_{C,t+1}} - r_{t+1}^F \right) b_t^F + \frac{R_t}{\pi_{C,t+1}} nw_t \tag{18}$$

where $(1-\chi)$ is the exit prob, and χ is the prob of continuation.

- incentive constraint: Gertler and Kiyotaki (2011), Mimir and Sunel (2019)

$$V_{jt} \geq \theta(b_t - \omega_l d_t) \tag{19}$$

- guess $V_t(nw_t) = \nu_{bt} b_t + \nu_{b_t^F} b_t^F + \nu_{nt} nw_t$
- Bank's problem can be rewritten as:

$$\begin{aligned} max_{b_t, b_t^F} \quad & \nu_{bt} b_t + \nu_{b_t^F} b_t^F + \nu_{nt} nw_t \\ & + \mu_t \left\{ \nu_{bt} b_t + \nu_{b_t^F} b_t^F + \nu_{nt} nw_t - \theta \left[b_t - \omega_l \left(b_t - nw_t - b_t^F \right) \right] \right\} \end{aligned} \tag{20}$$

- leverage ratio:

$$b_t - \omega_l d_t \equiv \kappa_t nw_t \tag{21}$$

- total net worths split btn new and old bankers:

$$nw_{ot} = \chi \left[\left(r_t^B - \frac{R_{t-1}}{\pi_{C,t}} \right) b_{t-1} + \left(\frac{R_{t-1}}{\pi_{C,t}} - r_t^F \right) b_{t-1}^F + \frac{R_{t-1}}{\pi_{C,t}} nw_{t-1} \right] \tag{22}$$

$$nw_{yt} = \iota b_{t-1}^B \tag{23}$$

- competitive market

$$\max \; E_t \sum_{i=0}^{\infty} \Lambda_{t,t+i} \left[q_{t+i} k_{t+i} - (1-\delta) q_{t+i} k_{t-1+i} - i_{t+i} \right] \tag{24}$$

s.t

$$k_t = (1-\delta) k_{t-1} + \left[1 - \frac{\kappa_I}{2} \left(\frac{i_t}{i_{t-1}} - 1 \right)^2 \right] i_t \tag{25}$$

- monopolistically competitive
- production function:

$$y_{H,t+k}(i) = A_{t+k} K_{t-1+k}^{\alpha} N_{t+k}^{1-\alpha} \tag{26}$$

- demand for its product from the final goods producers

$$y_{H,t+k}(i) = \left(\frac{P_{H,t+k}(i)}{P_{H,t+k}} \right)^{-\epsilon} y_{H,t+k} \tag{27}$$

- price adjustment costs: Rotemberg type

$$\frac{\kappa_P}{2} \left(\frac{P_{H,t}(i)}{P_{H,t-1}(i)} - \bar{\pi} \right)^2 P_{H,t} y_{H,t}$$

- Lagrangian:

$$\mathcal{L}^I = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{\lambda_t}{\lambda_0} \Bigg\{ \frac{P_{H,t}(i)}{P_{C,t}} \left(\frac{P_{H,t}(i)}{P_{H,t}} \right)^{-\epsilon} y_{H,t} - w_t h_t(i) - r_t^K k_{t-1}(i) \\ - \frac{\kappa_P}{2} \left(\frac{P_{H,t}(i)}{P_{H,t-1}(i)} - \bar{\pi} \right)^2 \frac{P_{H,t} y_{H,t}}{P_{C,t}} \\ - mc_t(i) \left[y_{H,t} \left(\frac{P_{H,t}(i)}{P_{H,t}} \right)^{-\epsilon} - a_t (k_{t-1}(i))^{\alpha} h_t(i)^{1-\alpha} \right] \Bigg\} \tag{28}$$

- perfect competition

$$y_{H,t} = \left[\int_0^1 y_{H,t}(i)^{\frac{\epsilon-1}{\epsilon}} di \right]^{\frac{\epsilon}{\epsilon-1}}, \quad \epsilon > 1. \tag{29}$$

- cost min leads to (27)

$$P\left(s_{t+1}^{V}=j|s_{t}^{V}=k\right)=\pi_{jk}^{V}, \qquad s_{t}^{V}\in\{1,2\}$$

Two Distinct Volatility States:

- Low-volatility state ($s_t^V = 1$)
- High-volatility state ($s_t^V = 2$)

$$e_{x,t}\sim\mathcal{N}(0,1)$$

$$\sigma_{x,s_t^V}>0, \qquad \text{where} \quad x\in\{R^F, Y^\star, \pi^\star, e_m, \varepsilon_C, A, \psi\}$$

Foreign Sector

$$\log(R_t^F) - \log(\bar{R}^F) = \rho_{R^F}(\log(R_{t-1}^F) - \log(\bar{R}^F)) + \sigma_{R^F, s_t^V} \cdot e_{R^F, t} \tag{30}$$

$$\log(Y_t^*) - \log(\bar{Y}^*) = \rho_{Y^*}(\log(Y_{t-1}^*) - \log(\bar{Y}^*)) + \sigma_{Y^*, s_t^V} \cdot e_{Y^*, t} \tag{31}$$

$$\log(\pi_t^*) - \log(\bar{\pi}^*) = \rho_{\pi^*}(log \pi_{t-1}^*) - \log(\bar{\pi}^*)) + \sigma_{\pi^*, s_t^V} \cdot e_{\pi^*, t} \tag{32}$$

$$Y_{H,t} = C_{H,t} + I_t + C^*_{H,t} + \frac{\kappa_P}{2}(\pi_{H,t} - \bar{\pi})^2 Y_{H,t} \quad (33)$$

and

$$q_t k_t = b_t \quad (34)$$

$$\log(\varepsilon_{C,t}) = \rho_\varepsilon \log(\varepsilon_{C,t-1}) + \sigma_{\varepsilon_C, s_t^V} \cdot e_{\varepsilon_C t} \quad (35)$$

$$\log(A_t) - \log(\bar{A}) = \rho_A(\log(A_{t-1}) - \log(\bar{A})) + \sigma_{A,s_t^V} e_{A,t} \quad (36)$$

$$\log(\psi_t) - \log(\bar{\psi}) = \rho_\psi(\log(\psi_{t-1}) - \log(\bar{\psi})) + \sigma_{\psi,s_t^V} \cdot e_{\psi,t} \quad (37)$$

- Taylor-type rule

$$\log(R_t) - \log(\bar{R}) = \rho_R \left(\log(R_{t-1}) - \log(\bar{R})\right) + (1 - \rho_R)\Bigg[\rho_\pi \left(\log(\pi_{H,t}) - \log(\bar{\pi}_H)\right)$$
$$+ \rho_Y \left(\log(Y_{H,t}) - \log(\bar{Y}_H)\right) + \rho_S \left(\log\left(\frac{S_t}{S_{t-1}}\right) - 1\right)\Bigg] + \sigma_{e_m} \cdot e_{m,t} \quad (38)$$

- Markov process

$$P\left(s^P_{t+1} = j | s^P_t = k\right) = \pi^P_{jk}, \qquad s^P_t \in \text{Managed Float, Floating Exchange Rate}$$

- Policy response to exchange rate fluctuations:

$$\rho_{S,t} = \begin{cases} \rho_S > 0, & \text{if } s^P_t = \text{Managed Float} \\ 0, & \text{if } s^P_t = \text{Floating Exchange Rate} \end{cases}$$

- Gertler et al. (2007), Batini et al. (2010), Balma (2014), Curdia and Finocchiaro (2013)

3. The Generic Framework and the Solution Approach

- The Model

$$E_t \sum_{r_{t+1}=1}^{h} p_{r_t, r_{t+1}} \left(\mathcal{I}_t\right) f_{r_t} \left(x_{t+1} \left(r_{t+1}\right), x_t \left(r_t\right), x_{t-1}, \theta_{r_t}, \theta_{r_{t+1}}, \varepsilon_t\right) = 0$$

- Minimum state variable (MSV) solution

$$x_t = \mathcal{T}_{r_t}(x_{t-1}, \varepsilon_t)$$

- p-th order perturbation

$$\mathcal{T}^{r_t}\left(z_t\right) \simeq \mathcal{T}^{r_t}\left(\bar{z}_{r_t}\right) + \mathcal{T}_z^{r_t}\left(z_t - \bar{z}_{r_t}\right) + \frac{1}{2!}\mathcal{T}_{zz}^{r_t}\left(z_t - \bar{z}_{r_t}\right)^{\otimes 2} + \ldots + \frac{1}{p!}\mathcal{T}_{z^{(p)}}^{r_t}\left(z_t - \bar{z}_{r_t}\right)^{\otimes p}$$

- System State variable

$$z_t \equiv \left[\begin{array}{ccc} x_{t-1}' & \chi & \varepsilon_t' \end{array}\right]'$$

4. Econometric Strategy: Bayesian Estimation and Filtering Techniques

Bayesian Estimation

- Incorporation of prior information: theoretical and empirical knowledge
- Handling parameter uncertainty: full posterior distributions
- Flexible treatment of nonlinearities: policy regime shift

Filtering Techniques

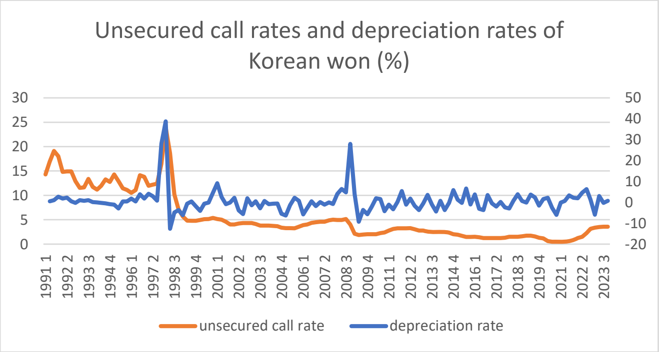
- The Kim-Nelson Filter (GPB2)
- The Interacting Multiple Model (IMM) Filter

5. Data and Estimation Results

Observables

- **sample period: 1991Q1-2023Q4**
- per capita private consumption
- per capita output
- per capita fixed investment
- policy interest rates
- US per capita GDP
- US CPI inflation rates
- US policy interest rates

Model Estimatiion Challenges



Calibration

small

Table: Calibration of parameters

Parameter	Value	Description	Reference
β	0.99	subjective discount factor	
α	0.4	elasticity of production with respect to capital	Korean data
ϵ	6	elasticity of substitution between differentiated goods	
δ	0.025	depreciation rate	
σ_C	2	degree of relative risk aversion	
σ_N	1	inverse of Frisch elasticity	
h	0.75	degree of habit formation	
C/C^*	1/50	share of South Korean output relative to the World	OECD data
η	1.5	elasticity of substitution between home and foreign goods	Faia and Monacelli (2008)
η^*	1.5	elasticity of substitution between foreign and home goods	
$1 - a_C$	0.4	openness parameter	Korean data
χ	0.9	survival rate of banks	
ω_I	0.4	bankers' incentive constraint parameter	
κ	4	leverage ratio of banks	Korean data
$R^B - R$	0.0035	spread between lending and deposit rate	Korean data
$R - R^F$	0.0023	spread between domestic and foreign borrowing rates	$\frac{\omega_I(R^B - R)}{1-\omega_I}$
θ	0.314	bankers' incentive constraint parameter	derived from ω_I, $R^B - R$, $R - R^F$, and κ
b^F/Y_H	0.3	debt to GDP ratio	
Y_H	1	normalization of domestic output	
N	1/3	steady state work hours	
$\pi_H = \pi_C$	1.01	steady state domestic and CPI inflation rate	
κ_N		labor disutility parameter	adjusted so that N=1/3
κ_P		price stickiness parameter	adjusted so that Calvo type price stickiness parameter =0.66

Table: Model Estimation Results: Stochastic-Switch Model

Parameter	Distribution	Prior	Posterior Mode	Mode Std
κ_I	GAMMA	3	2.098099	0.047590
ψ_R	GAMMA	1.1	1.131760	0.002808
ρ_π	GAMMA	1.5	1.313576	0.003783
ρ_Y	BETA	0.5	0.430077	0.002525
ρ_A	BETA	0.7	0.888103	0.007337
ρ_m	BETA	0.7	0.972646	0.000360
ρ_ψ	BETA	0.7	0.874838	0.014761
ρ_{ε_C}	BETA	0.7	0.455973	0.006409
ρ_{Y^*}	BETA	0.7	0.829489	0.004442
ρ_{π^*}	BETA	0.7	0.737040	0.010551
ρ_{R^F}	BETA	0.7	0.904828	0.000650
$\rho_{S,\text{monPol},1}$	GAMMA	0.5	1.060602	0.004094
$\rho_{S,\text{monPol},2}$	GAMMA	0.01	0.000000	0.000000
$\text{monPol}_{tp,1,2}$	BETA	0.1	0.000606	0.000022
$\text{monPol}_{tp,2,1}$	BETA	0.01	0.008848	0.000190

Table: Model Estimation Results: Stochastic-Switch Model

Parameter	Distribution	Prior	Posterior Mode	Mode Std
$\text{vol}_{tp,1,2}$	BETA	0.1	0.072468	0.002325
$\text{vol}_{tp,2,1}$	BETA	0.01	0.001647	0.000040
$\sigma_{A,\text{vol},1}$	IGAMMA1	0.01	0.017368	0.000177
$\sigma_{A,\text{vol},2}$	IGAMMA1	0.03	0.082275	0.000298
$\sigma_{m,\text{vol},1}$	IGAMMA1	0.0025	0.000516	0.000005
$\sigma_{m,\text{vol},2}$	IGAMMA1	0.0075	0.001860	0.000025
$\sigma_{\psi,\text{vol},1}$	IGAMMA1	0.01	0.010686	0.000062
$\sigma_{\psi,\text{vol},2}$	IGAMMA1	0.03	0.052352	0.000208
$\sigma_{\varepsilon_C,\text{vol},1}$	IGAMMA1	0.01	0.045744	0.000145
$\sigma_{\varepsilon_C,\text{vol},2}$	IGAMMA1	0.03	0.181846	0.000383
$\sigma_{Y^*,\text{vol},1}$	IGAMMA1	0.01	0.004395	0.000013
$\sigma_{Y^*,\text{vol},2}$	IGAMMA1	0.03	0.013126	0.000044
$\sigma_{\pi^*,\text{vol},1}$	IGAMMA1	0.01	0.006468	0.000011
$\sigma_{\pi^*,\text{vol},2}$	IGAMMA1	0.03	0.007787	0.000010
$\sigma_{R^F,\text{vol},1}$	IGAMMA1	0.0025	0.000562	0.000001
$\sigma_{R^F,\text{vol},2}$	IGAMMA1	0.0075	0.001363	0.000004

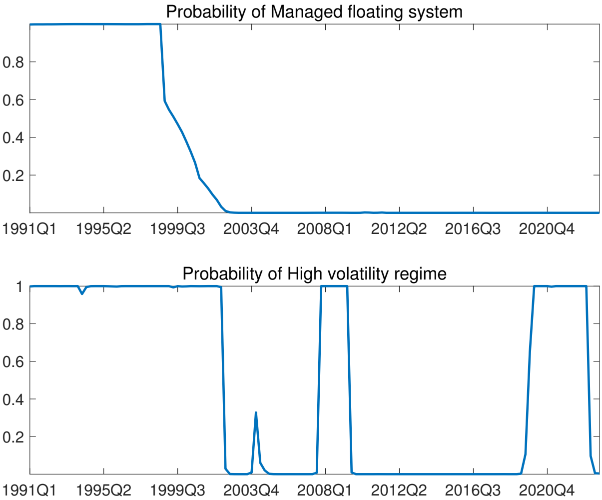


Figure: The upper panel depicts the probabilities associated with the managed floating system, while the lower panel illustrates the probabilities of the high volatility regime.

IRF wrt the Monetary Policy Shock

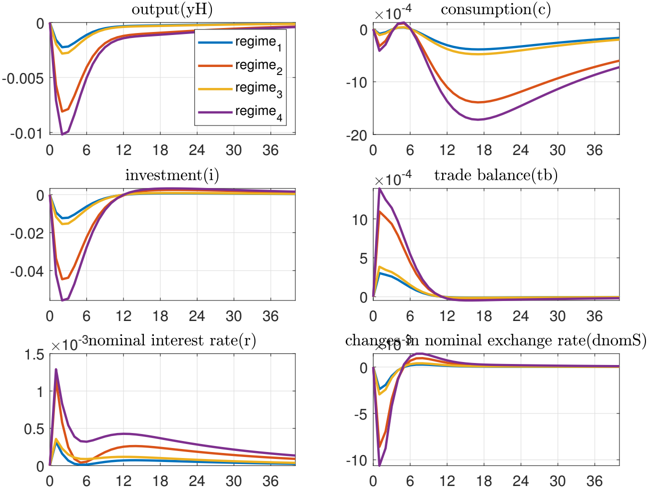


FIGURE: *Regime*$_1$, *Regime*$_2$, *Regime*$_3$, and *Regime*$_4$ correspond respectively to the following exchange rate frameworks: the managed floating regime with low volatility, the managed floating regime with high volatility, the flexible exchange rate regime with low volatility, and the flexible exchange rate regime with high volatility.

6. Counterfactuals

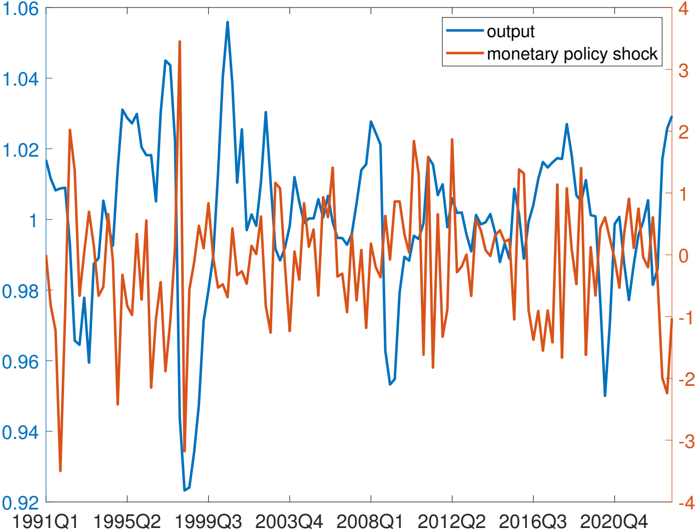


Figure: Output and monetary policy shock: Stochastic-Switch

Counterfactuals 1: half of the monetary policy shock in 1998Q1

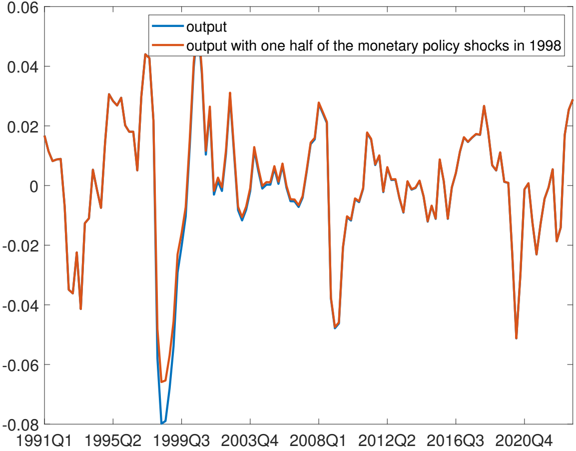


Figure: Actual output (blue lines) and simulated counterfactual output (red lines): Stochastic switch model, Medium-High Interest Rate Policy in 1998Q1

Counterfactuals 2: devaluation in 1997Q3 with one half of the MP shock in 1998Q1

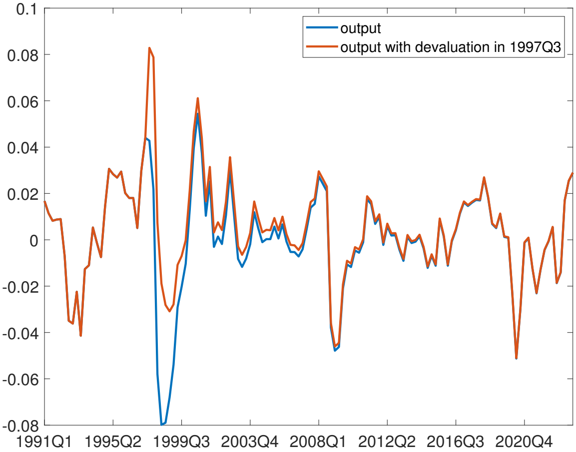


Figure: Actual output (blue lines) and simulated counterfactual output (red lines): Stochastic switch model, Devaluation in 1997Q3 combined with Medium-High Interest Rate Policy in 1998Q1

Counterfactuals 3: devaluation in 1997Q3 only

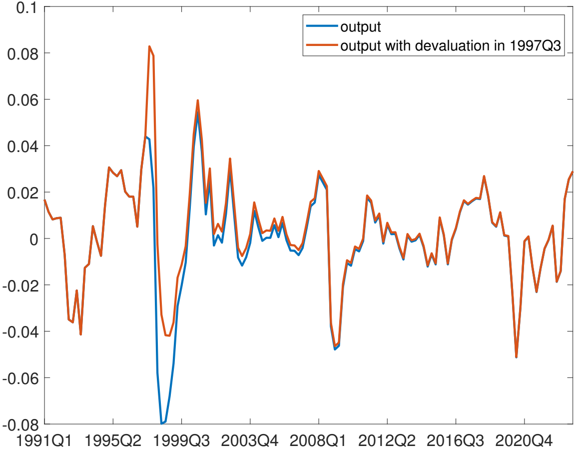


Figure: Actual output (blue lines) and simulated counterfactual output (red lines): Stochastic switch model, Devaluation in 1997Q3 with very high Interest Rate Policy in 1998Q1

More Realistic Risk Premium Shock

$$\log(\psi_t) - \log(\bar{\psi}) = \rho_\psi(\log(\psi_{t-1}) - \log(\bar{\psi})) - \rho_{\psi dS}(\log(dS_{t-1}) - \log(\bar{dS})) + \sigma_{\psi, s_t^V} \cdot e_{\psi,t} \quad (37')$$

instead of

$$\log(\psi_t) - \log(\bar{\psi}) = \rho_\psi(\log(\psi_{t-1}) - \log(\bar{\psi})) + \sigma_{\psi, s_t^V} \cdot e_{\psi,t} \quad (37)$$

Counterfactuals 4: More Realistic RP Shock with devaluation in 1997Q3 only

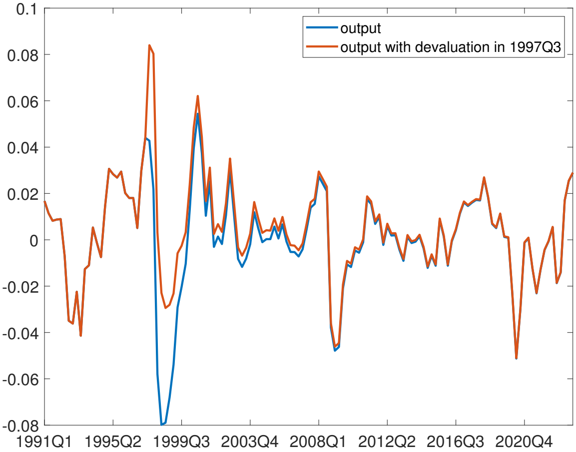


Figure: Actual output (blue lines) and simulated counterfactual output (red lines): Stochastic switch model, Devaluation in 1997Q3 with very high Interest Rate Policy in 1998. Risk premium shock follows:
$\log(\psi_t) - \log(\bar{\psi}) = \rho_\psi(\log(\psi_{t-1}) - \log(\bar{\psi})) - \rho_{\psi dS}(\log(dS_{t-1}) - \log(\bar{dS})) + \sigma_{\psi, s_t^V} \cdot e_{\psi,t}$

conditional lifetime utility

$$V_0 = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t U(C_t, N_t).$$

social welfare

$$V_0 = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t U(C, N) \tag{39}$$

$$V_0^p = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t U(C_t^p, N_t^p), \tag{40}$$

welfare cost measure

$$\lambda = 1 - \left[\frac{(1-\sigma_C)(1-\beta)(V_0^p - V_0)}{((1-h)C)^{1-\sigma_C}} + 1 \right]^{1/(1-\sigma_C)} \tag{42}$$

2nd order approximation

$$\lambda \approx -\frac{(1-\beta)}{((1-h)C)^{1-\sigma_C}}(V_0^p - V_0) - \frac{\sigma_C(1-\beta)^2}{2((1-h)C)^{2(1-\sigma_C)}}(V_0^p - V_0)^2 \tag{43}$$

Welfare Cost

Table: Welfare cost difference between the actual and counterfactual policies

Model	Welfare cost difference(%)		
	CF1	CF2	CF3
HP filtered data			
Stochastic-switch	0.02	0.1	0.08

CF1: Medium-high interest rate policy in 1998Q1
CF2: Devaluation in 1997Q3 combined with medium-high interest rate policy in 1998Q1
CF3: Devaluation in 1997Q3 only

7. Robustness of the Results

Table: Robustness of results: Various models and parameters

Model	Log-post	Log-lik	Log-MDD (Laplace)
HP filtering			
Stochastic-switch	3522.3	3371.2	3234.9
Constant parameter	3218.7	3202.5	3156.4
Known-switch	3194.5	3196.0	3118.0
2nd order detrening			
Stochastic-switch	3437.8	3263.4	3284.6
Constant parameter	3107.5	3101.2	3066.5
Known-switch	3091.9	3098.2	3013.3
HP Filtering, Stochastic-switch Model, Different parameters			
h=0 (no habit)	3374.5	3385.9	3251.2
$\omega_I = 0$ (UIP)	3502.0	3370.5	3345.5
$\eta = 0.5, \eta^* = 1, B^F = 0, \pi_C = \pi_H = 1$	3336.4	3370.8	3098.0

UIP stands for uncovered interest rate parity.

8. Concluding Remarks

- medium-high interest rate policy in Q1 1998
- a strategic 10% currency devaluation in Q3 1997

⇒ could have substantially mitigated the severity of the economic downturn experienced in 1998

Appendices

Appendix A. Data

Korean data from the Bank of Korea

- national accounts: seasonally adjusted, quarterly, real (2020 price) data code: 2.1.2.2.2

⇒ private consumption, fixed investments, GDP

- every component of GDP is divided by the population in order to have the corresponding per capita terms. For example, real GDP per capita = real GDP/population
- Won/$ exchange rate: 3.1.2.3
- unsecured call rate (policy rate): 1.3.2.2
- consumer price index: 4.2.1

Korean data from the KOSIS

- population

US data from FRED(Link: https://fred.stlouisfed.org)

- Real gross domestic product per capita, Chained 2017 Dollars, Quarterly, Seasonally Adjusted Annual Rate (A939RX0Q048SBEA)
- Consumer Price Index for All Urban Consumers: All Items in U.S. City Average, Index 1982-1984=100, Quarterly, Seasonally Adjusted (CPIAUCSL)
- Federal Funds Effective Rate, Percent, Quarterly, Not Seasonally Adjusted (FEDFUNDS)