Online Appendix

The Japanese Macropolity: Mandate and Accountability Representation in Postwar Japan

Hanako Ohmura

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Descriptive Statistics

	vars	n	mean	sd	median	min	max	skew	kurtosis
GrM	1	58.00	5.33	3.20	5.28	4.98	13.41	0.86	0.05
ReM	2	58.00	5.33	3.20	4.60	0.02	13.34	0.42	-0.42
U	3	58.00	2.81	1.31	2.55	1.10	5.40	0.39	-1.12
C	4	58.00	75.12	31.08	89.00	18.40	103.30	-0.73	-1.18
Up	5	58.00	0.33	0.47	0.00	0.00	1.00	0.72	-1.51
Lo	6	58.00	0.34	0.48	0.00	0.00	1.00	0.64	-1.62
Rl	7	58.00	57.63	6.76	57.00	47.55	68.10	0.13	-1.19
G	8	58.00	4.13	4.15	2.95	-3.50	14.50	0.81	-0.14
sw	9	57.00	0.80	0.50	0.73	0.00	1.74	0.15	-1.35
Cm	10	57.00	13.57	4.41	13.70	5.21	22.00	-0.11	-1.05
EPol	11	58.00	2.46	1.50	1.91	0.00	5.18	0.37	-1.25
WPol	12	58.00	10.58	7.82	7.92	0.00	30.30	1.12	0.22

Estimations' Setting

The SVAR model estimation scheme is set per the below;

$$A(L)\underbrace{y_t}_{1\times m} = \underbrace{\omega_t}_{1\times m} \tag{1}$$

$$where, A(L) = \underbrace{A_0}_{m\times m} - \sum_{l=1}^{l}\underbrace{A_l}_{m\times m}\underbrace{L_l}_{1\times m} \tag{2}$$

$$\underbrace{\omega_t}_{1\times m} = \underbrace{c}_{1\times m} + \underbrace{\varepsilon_t}_{1\times m}, \qquad \varepsilon_t \sim i.i.d(0,D) \tag{3}$$

$$E[y_{t-l}\varepsilon_t] = 0\,\forall l,\ E[\acute{\varepsilon}_t\varepsilon_t] = \Omega_\varepsilon,\ t = 1,2,\ldots,T. \tag{4}$$

In equations (1) and (2), $A(L)$ denotes the relationship between A_0 and A_l. Here, A_0 is a contemporaneous (0) coefficient matrix, and $A_l(l = 1, \cdots, l)$ refers to the l^{th} lag coefficient matrix (L_l denotes lth lag term). y_t is $m \times 1$ vector of observations for m variables at t, and ω_t is composed of a vector of disturbance with a structural (external) shock ε_t and a vector of constants c as in the equation (3). Now ε_t is assumed to be mutually independent so that the variance-covariance matrix consists of a diagonal one. Whole mathematical process of B-SVAR will be based on Brandt and Freeman (2006, 2009) and Sims and Zha (1998, 1999). And estimation and sampling by the posterior of the above model can be computed, based on a Gibbs sampler, a Markov Chain Monte Carlo algorithm (20,000 draws with 2000 burn-in).

Then, the hyperparameter of posterior distribution is set as in Table 1

Table 1: The values of hyperparameter

Hyperparameter	Values	Two Specifications	
		Non-stationary model	Stationary model
λ_0	Overall scale of the error covariance matrix	0.4	0.4
λ_1	Standard deviation about A_1 (persistence)	0.6	0.1
l^{λ_3}	Lag decay	4	2
λ_4	Scale of standard deviation of intercept	0.6	0.1
λ_5	Scale of standard deviation of exogenous variables coefficients	0.6	0.1
μ_5	Sum of autoregressive coefficients component	4	2
μ_6	Dummy initial observations component	4	2

Note: Brandt and Freeman (2006, 2009), see also Sims and Zha (1998).

These settings reflect the prior belief for the inherent status of the Japanese macro polity. I will estimate two types of models in terms of the stationarity/non-stationarity (persistence) of political and economic variables. As pointed out in the BF model, "EMS [Erikson, McKuen and Stimson] repeatedly express a belief [of] macropartisanship in integrated order one, or that is a random walk with drift" (Brandt and Freeman 2009: 131). Along this line, a researcher should compare two types of models based on the prior belief of stationarity or nonstationarity.

To assume non-stationary in the first model, I employ prior beliefs of higher persistence around the first lag A_1 ($\lambda_1 = 0.6$); the higher fixed effect of each time-component ($\lambda_4 = 0.6$); the higher autoregressive coefficients assuming the-likely-existing unit root ($\mu_5 = 4$). By contrast, in the non-stationary model, we take the lower persistence around the first lag ($\lambda_1 = 0.1$); a lower fixed effect ($\lambda_4 = 0.1$); and higher autoregressive coefficients assuming the-unlikely-existing unit root ($\mu_5 = 2$). Additionally, to treat the endogeneity of the lagged structures among political and economic variables, the lag decay l^{λ_3} is set as 4. It is based on the computation which shows the almost same decays both in harmonic and quadratic specifications[1].@

By contrast, in the second stationary model, I adopt the lower persistence around the first lag ($\lambda_1 = 0.1$); the lower fixed effect of each time-component ($\lambda_4 = 0.1$); the smooth lag decay (l^{λ_3}=2); the higher autoregressive coefficients assuming the-likely-existing unit root ($\mu_5 = 2$).

In addition to the setting of hyperparameters, the other required setting is for identifying restrictions. In both frequentist and Bayesian SVAR models, many parameters for simultaneous and lagged relationship (A_0 and A_+, respectively) are estimated. In this analysis, I will impose non-recursive restrictions in order to estimate the theory-based-model. The detailed model setting is

[1]The confirmation has done by the visualization of lag decay comparing the harmonic (setting the decay as one) and quadratic (setting as two) patterns. It tells the latter is validated. The command "`decay.spec`" is used.

allowed in Appendix. These identifying restrictions are enumerated in Table 2. "a" in Table 2 means the comtemporaneous relationship, and "zero", the zero constraint otherwise[2].

Table 2: The identifying restrictions

Classifications	Variables	GrM	ReM	Mn	Cm/SW	Up	Lo	Rl	C	U	G
Public Opinion	Growth Mood(GrM)	a	a	a	a	a	a	a	0	0	0
	Relief Mood(ReM)	a	a	a	a	a	a	a	0	0	0
Policy	Manifesto(Mn)	a	a	a	a	a	a	a	0	0	0
	Compensation(Cm)/Welfare(SW)	a	a	a	a	a	a	a	0	0	0
Political Condition	Upper Election(Up)	0	0	0	0	a	0	a	0	0	0
	Lower Election(Lo)	0	0	0	0	0	a	a	0	0	0
Accountability	Ruling Vote Share(Rl)	a	a	a	a	a	a	a	0	0	0
Economy	CPI(C)	0	0	0	0	0	0	0	a	0	0
	Unemployment Rate(U)	0	0	0	0	0	0	0	0	a	0
	GDP Growth(G)	0	0	0	0	0	0	0	0	0	a

Note: "a" means a contemporanepus relationship, "0" refers to zero restriction otherwise.

Judging the Model of Best Fit

Firstly, regarding the full (10 variables) model, I will compare the results of model fit between the stationary and non-stationary model (see Table 3)[3]. The log posterior density of the nonstationary model is -514.2256 ($=LogLikelihood, Pr(Y \mid A_0, A_+) + LogPrior, Pr(A_0, A_+)$) and the stationaly model is -534.5627. Run with this LPD values, the Bayesian information criterion is 2345.3882 ($= -2LPD + PenaltyLog(Pr(Y))$) in the nonstationary model and 3187.3894 in the stationary model. Given the varying difference between the two values, we can not easily judge the best model. However, by computing $2Log(BayesFactor)$, the result is 1659.39, affording the solid evidence that the stationary model's fit is better[4].

With respect to the political (5 variables) model, the log posterior density of the non-stationary model is -254.16999 and the stationaly model is -246.67929 (see also Table 3). Run with this LPD values, the Bayesian information criterion is 1042.05498 in the non-stationary model and 1206.12428 in the stationary model. The difference of each model is the same at 41 so we can interpret the larger values of LPD and BIC in the stationary model (7.4907 in LPD and 164.0648) as a firm evidence that the stationary model's fit is better.

Both the full and political models about social welfare, along the same computation, we obtain the results which stationary model shows the better fit (see Table 4).

From these results of the full and political models, it is also likely to imply that the Japan's politico-economic system, wherein public moods are embraced, is characterized with the frequent fluctuation rather than the long-term stable status. Hence we can find the critical difference in the characteristics of public opinion, the long-term stability in the U.S. and the short-term variation in Japan.

[2] The estimation will be conducted by a software, `R2.15.0` and a package, "`SVAR0.6-0`" developed by Patrick T. Brandt.

[3] In order to compute the log likelihood, and judge the fitted model, I use a command, "`posterior.fit`".

[4] $2Log(BayesFactor) = 2Log(LogMarginalDensity_{(Non-Stationary)} - LogMarginalDensity_{(stationary)}) = 2(-1823.61 - (-2653.305)) = 1659.39$.

Table 3: LPD and BIC values of Stationaly and Non-stationary models: Compensation

Full model						
LPD		BIC		LMD		
Non-	Stationary	Non-	Stationary	Non-	Stationary	$2Log(BayesFactor)$
-514.2256	-534.5627	2345.3882	3187.3894	-1823.61	-2653.305	1659.39
Political model						
LPD		BIC		LMD		
Non-	Stationary	Non-	Staitonary	Non-	Stationary	$2Log(BayesFactor)$
-254.16999	1042.05948	-246.67929	1206.12428	-800.5366	-973.5438	346.0144

Note: LPD=Log Posterior Density; BIC=Bayes Information Criterion; LMD=Log Marginal Data Density (=$Log(Pr(y))$).

Table 4: LPD and BIC values of Stationaly and Non-stationary models: Social welfare

Full model						
LPD		BIC		LMD		
Non-	Stationary	Non-	Stationary	Non-	Stationary	$2Log(BayesFactor)$
-554.3121	-574.2801	1108.6242	3319.9882	-1920.12	-2751.325	13.44575
Political model						
LPD		BIC		LMD		
Non-	Stationary	Non-	Stationary	Non-	Stationary	$2Log(BayesFactor)$
-287.73545	-280.47836	575.4709	1303.58962	-866.2469	-1039.101	10.3049

Note: LPD=Log Posterior Density; BIC=Bayes Information Criterion; LMD=Log Marginal Data Density (=$Log(Pr(y))$).