On the International Business Cycle Co-movement in East Asia
Some evidence and thoughts for an Asian Monetary Union

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By

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N.B. My presentation is based on a joint research paper entitled "*A FAVAR Analysis of the Business Cycle Co-movement in Asia: An Asian currency union may be closer than you think!*" with HS Huh of Yonsei University and WJ Kim of Kangwon National University.

1. Background

- **According to the OCA literature (due to R. Mundell): facing similar shocks important, among other criteria, is a pre-condition.**
- **What is the current status of business cycle synchronisation in East Asia? Any evidence of decoupling? How important is the regional cycle?**
- **Gravity theory and evidence suggest high correlations between countries with geographic, income, cultural, and institutional proximities, not trade!**
- **But, East Asia is so heterogeneous in terms of per capita income, geographic proximity, industrial structure, language (culture) and institutions.**
  - **i. High, Middle and Low income countries co-exist**
  - **ii. North East vs South East**
  - **iii. Greater China (mainland China, HK China and Taiwan)**

- **Trade and Financial integration in East Asia a key issue; policymakers stepping up discussion on financial integration, e.g. *Chiang Mai Initiative*.**
- **Given the Eurozone crisis, should a future Asian monetary union be completely ruled out?**
- **Need theoretical and empirical research.**
- **In theoretical research, dynamic stochastic general equilibrium (DSGE) model is the analytical framework (e.g. Smets and Wouters (2003, 2007))**
- **In empirical research, correct modelling of unobservable (global, regional and country-specific) shocks is important: dynamic time series models with features such as Bayesian, unobserved components (state space), or non-linearity.**

2. Our study

- **Utilises a factor-augmented vector autoregressive model (FA VAR) model, due to Stock and Watson (2005), to overcome shortcomings of standard VAR approach.**
- **Why? Data rich environment. But shocks are unobservable.**
- **Identify *global*, *regional* and *idiosyncratic* real and nominal shocks affecting ASEAN5 + greater China, Japan and Korea.**
- **Estimate how they respond to different shocks to infer the possibility of coordinated policy responses.**
- **Comparable to Bagliano and Morana (2009) on Europe and US.**

3. Modelling approach

Dynamic Factor Model (DFM)

$$\begin{bmatrix} F_t \\ X_t \end{bmatrix} = \begin{bmatrix} \Phi(L) & 0 \\ \Lambda\Phi(L) & D(L) \end{bmatrix} \begin{bmatrix} F_{t-1} \\ X_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_t^F \\ \varepsilon_t^X \end{bmatrix}$$

Structural FAVAR

$$X_t = B^*(L)\xi_t + C^*(L)\psi_t$$

ξ_t = structural regional or global factor shocks, and ψ_t country specific idiosyncratic shocks.

Identify and estimate the following shocks:

Oil, World Demand, Regional Demand, Regional Relative Price, Regional Nominal

4. Data and Results

- ASEAN5 (namely, Indonesia, Malaysia, Singapore, Thailand and the Philippines), greater China (i.e. China, Hong Kong and Taiwan), Japan and Korea.
- Quarterly data on real GDP, real exchange rate, CPI inflation, M1 growth, real exports and real imports for 1993:1 – 2010:4.
- Oil price index (energy price proxy), US GDP and the aggregate European GDP (i.e. world GDP proxy)

Table 1: Principal components analysis: fraction of the variance explained

Block: GDP	PC_1	PC_2	PC_3	PC_4	PC_5
JP_GDP	0.639202	0.076758	0.002656	0.000854	0.240773
TH_GDP	0.73070	0.074935	0.000302	0.013031	0.00006
MY_GDP	0.769439	0.021679	0.025443	0.039334	0.007489
TW_GDP	0.706397	0.047652	0.008169	0.025564	0.007517
SG_GDP	0.591767	0.10578	0.000004	0.177755	0.089998
KR_GDP	0.748703	0.033731	0.060674	0.001321	0.012853
PH_GDP	0.527529	0.000044	0.442781	0.000053	0.005151
IN_GDP	0.607376	0.2728	0.00725	0.000764	0.000207
HK_GDP	0.767334	0.018104	0.012119	0.003024	0.010522
CN_GDP	0.59147	0.038676	0.004071	0.251382	0.025184

Table 1: Continued.

Block: DMO					
JP_DMO	0.097539	0.887852	0.00696	0.002845	0.00156
TH_DMO	0.905732	0.000154	0.028544	0.012245	0.010402
MY_DMO	0.948408	0.002749	0.000095	0.002763	0.005402
TW_DMO	0.623588	0.009037	0.338612	0.007582	0.002854
SG_DMO	0.838737	0.007369	0.00922	0.011465	0.04765
KR_DMO	0.723073	0.013675	0.000857	0.233079	0.008434
PH_DMO	0.826841	0.016163	0.066612	0.04106	0.003337
IN_DMO	0.783922	0.019941	0.013832	0.000302	0.160077
HK_DMO	0.930977	0.002686	0.000274	0.001459	0.002981
CN_DMO	0.879433	0.003762	0.00063	0.02	0.001618

Figure 1.1: Groups of Series with First Principal Components as Common Factors

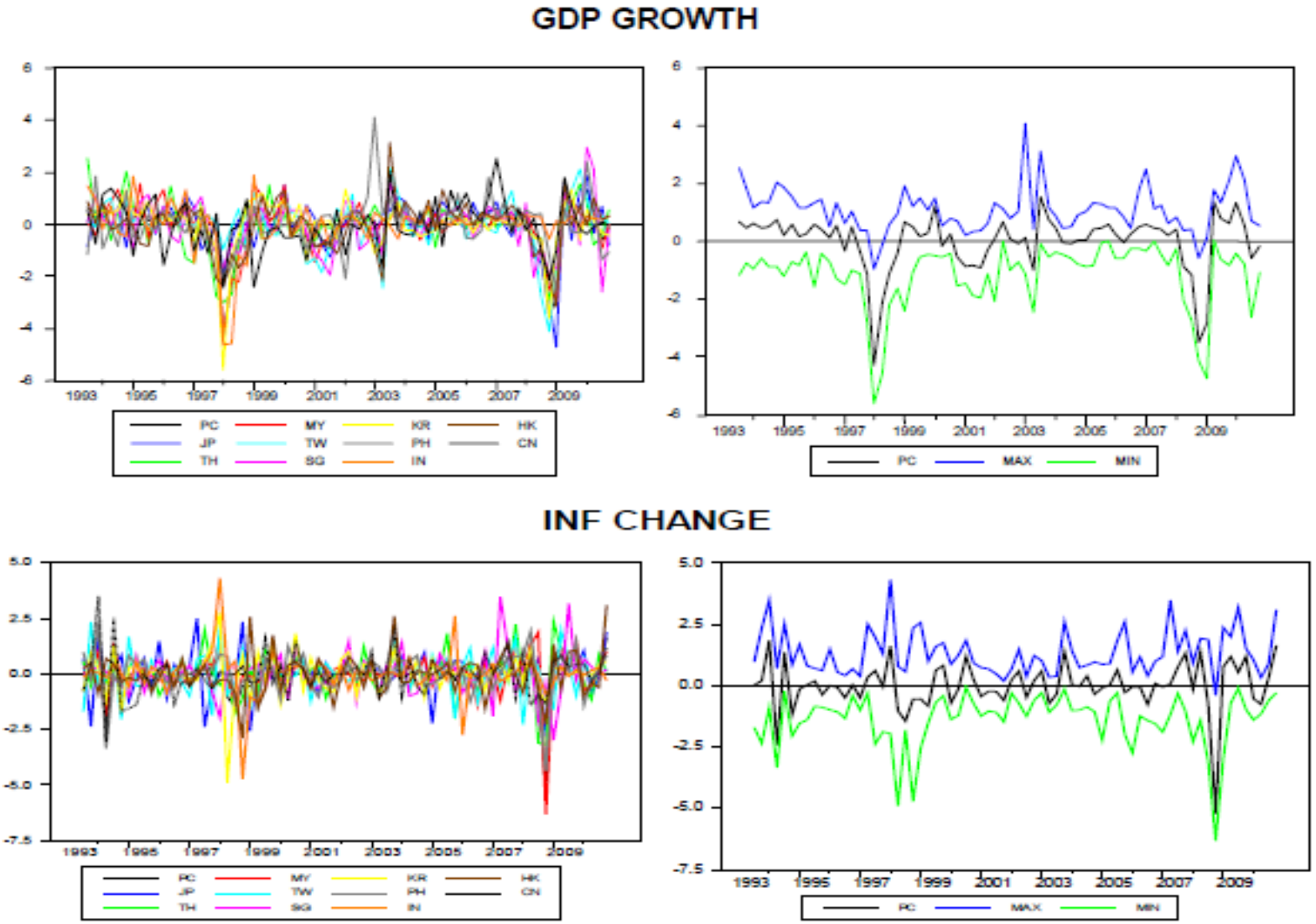


Figure 2: Dispersion of Common/idiosyncratic Components

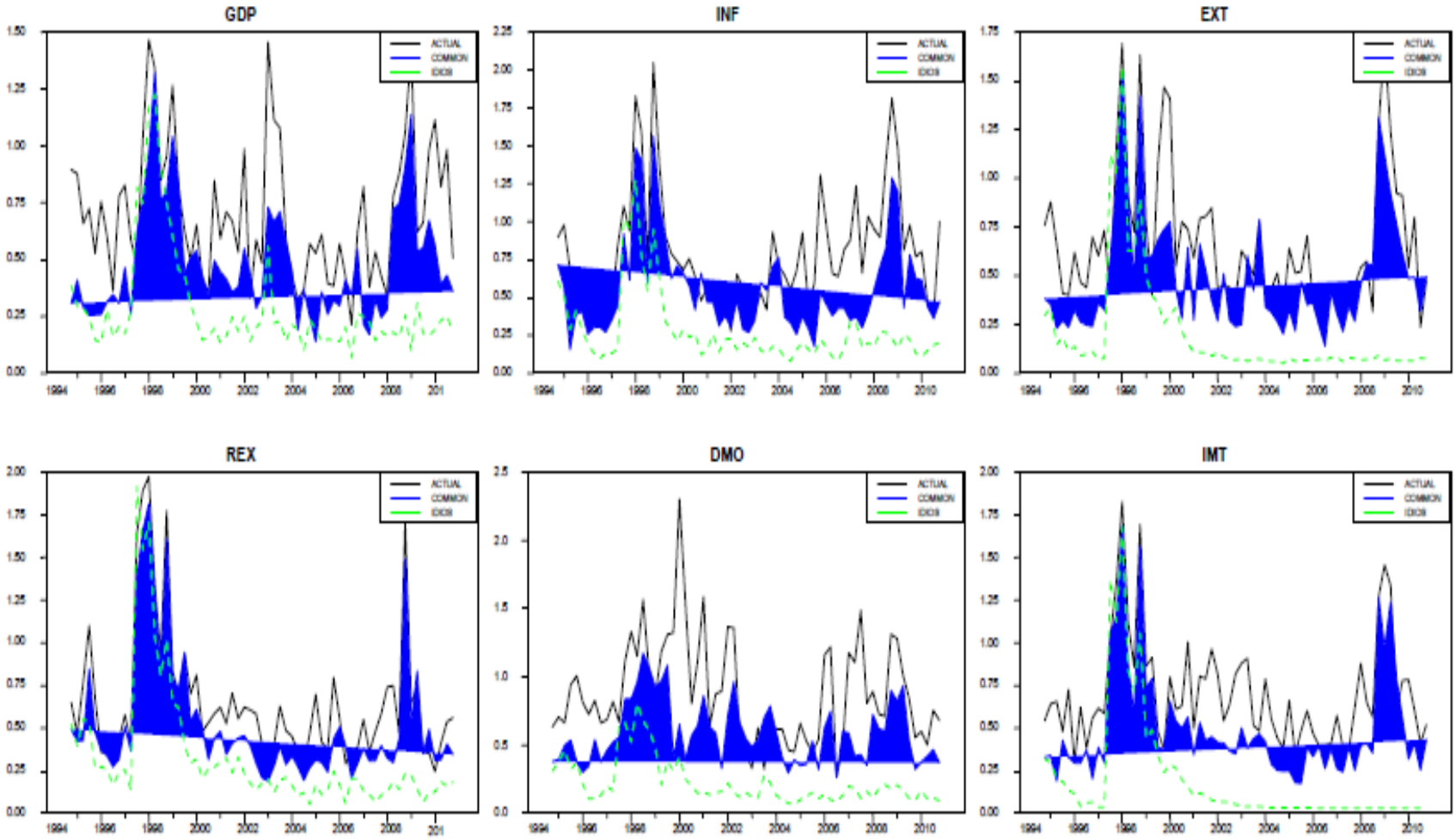


Figure 3.1: All Common Components - GDP

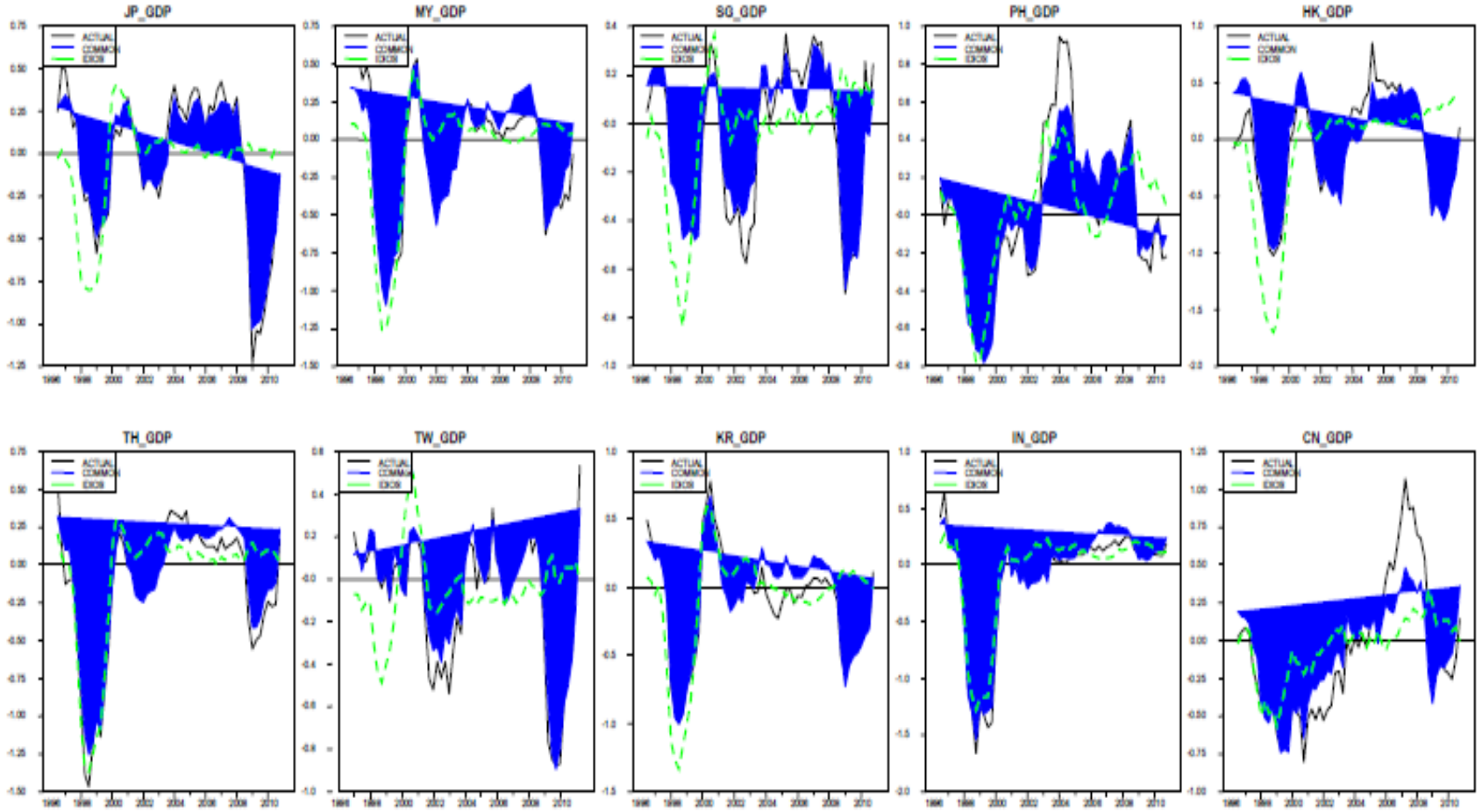
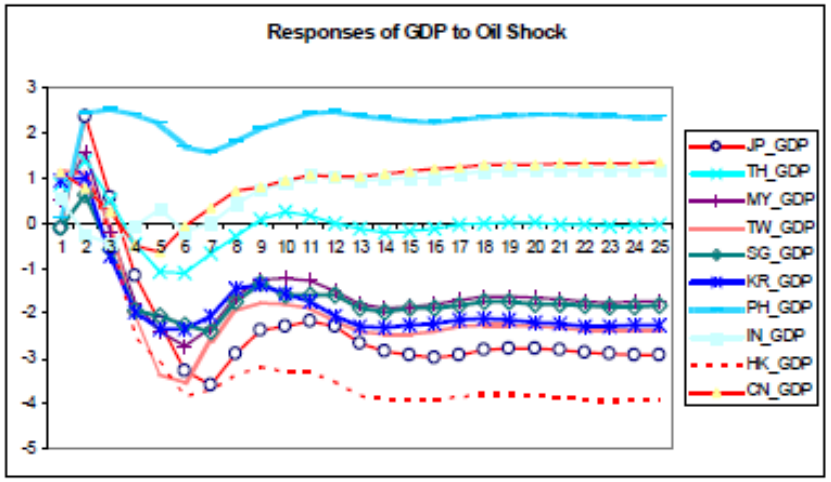


Figure 4.1: Impulse Responses to Oil Shock

(a)



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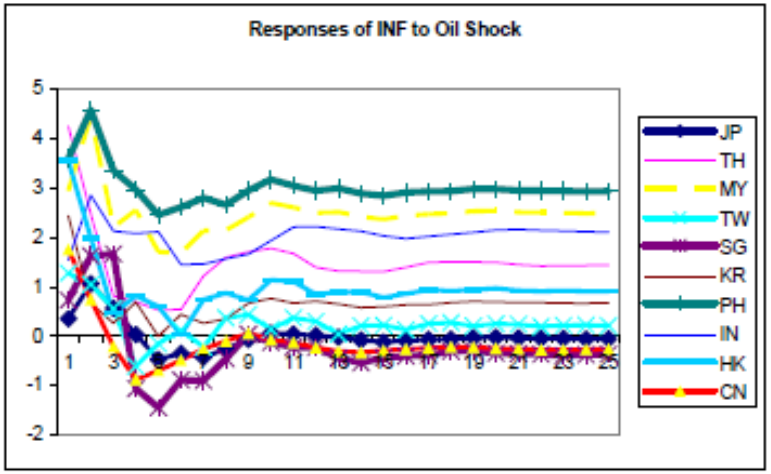
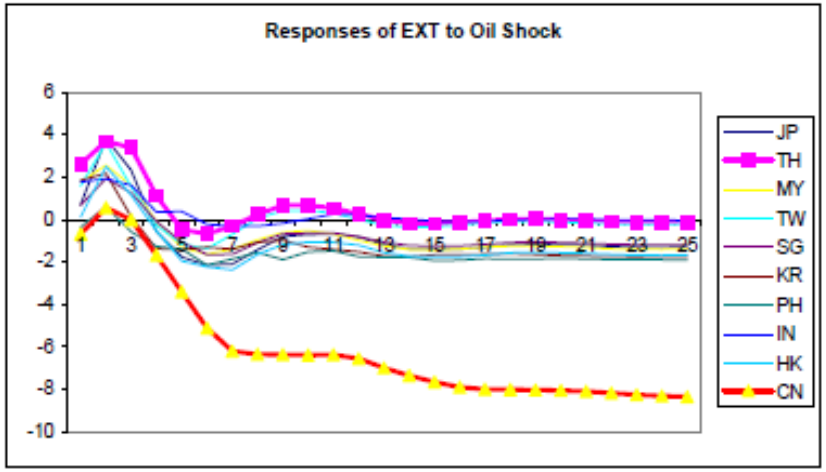


(c)



(d)

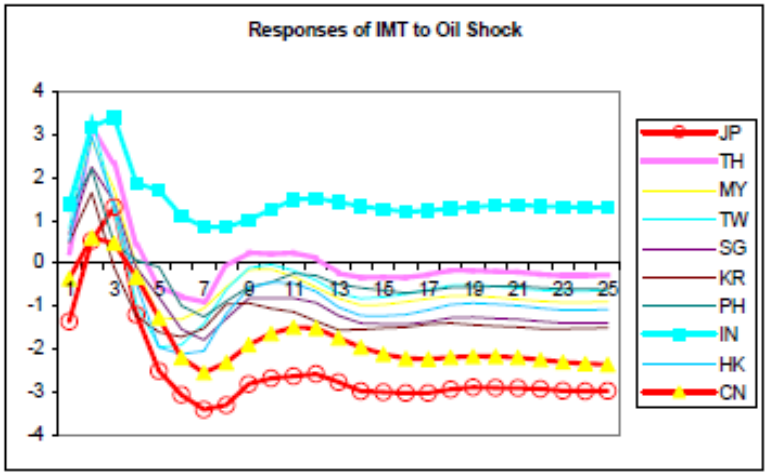
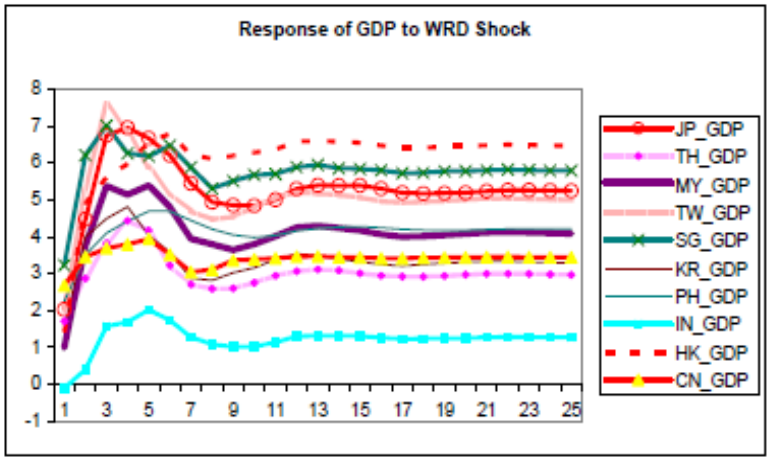
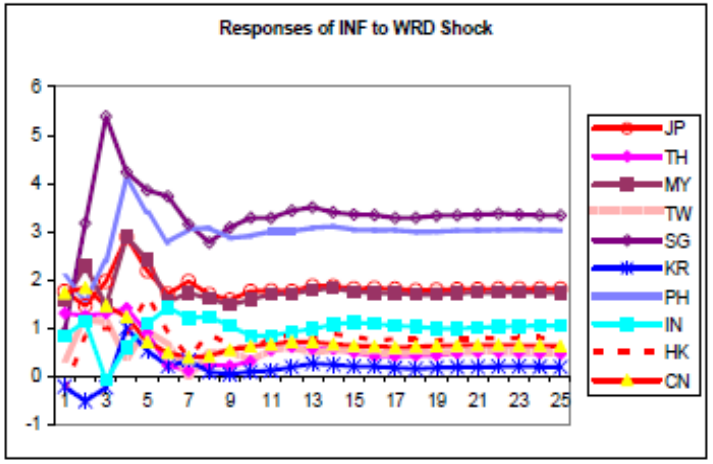


Figure 4.2: Impulse Responses to the world demand shock

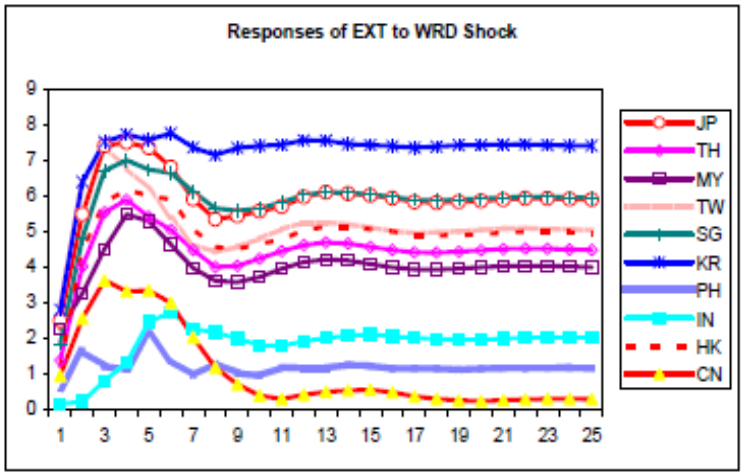
(a)



(b)



(c)



(d)

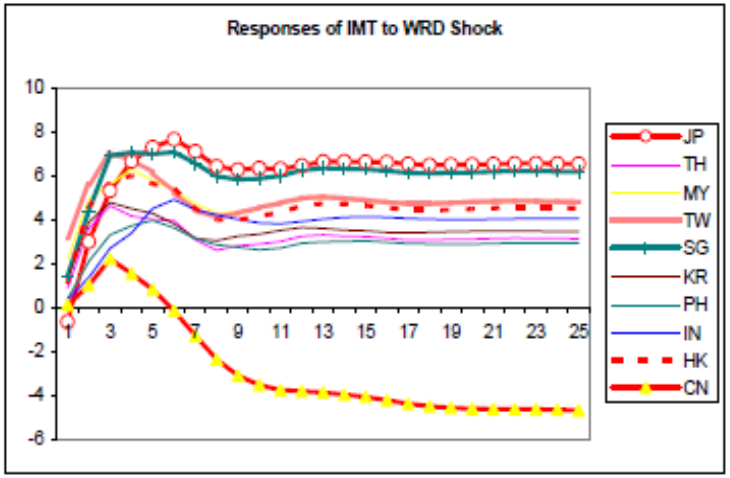
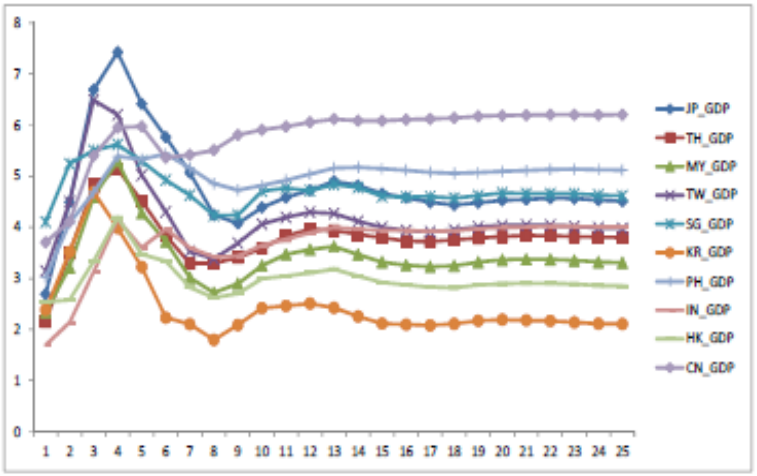
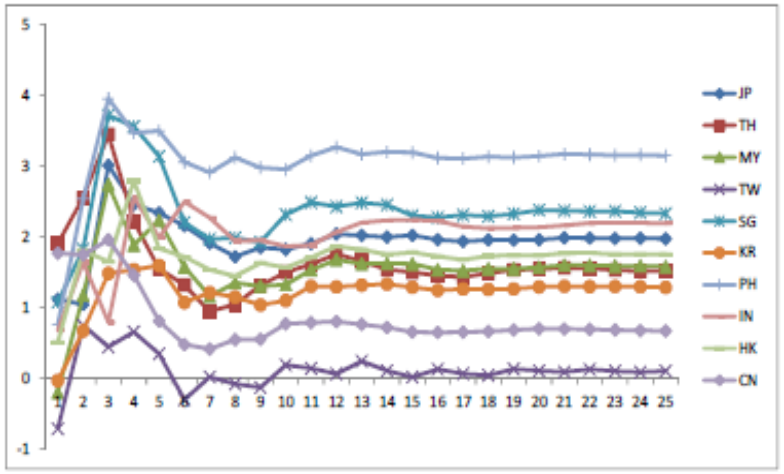


Figure 4.3: Impulse Responses to the regional output shock

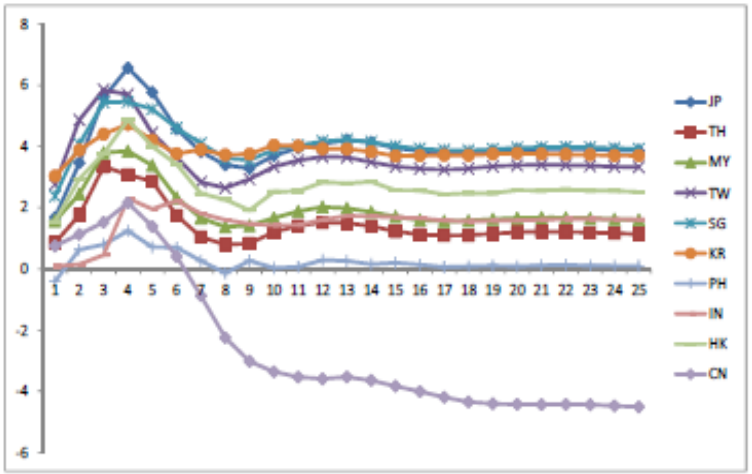
(a) Responses of GDP to Regional Output Shock



(b) Responses of INF to Regional Output Shock



(c) Responses of EXT to Regional Output Shock



(d) Responses of IMT to Regional Output Shock

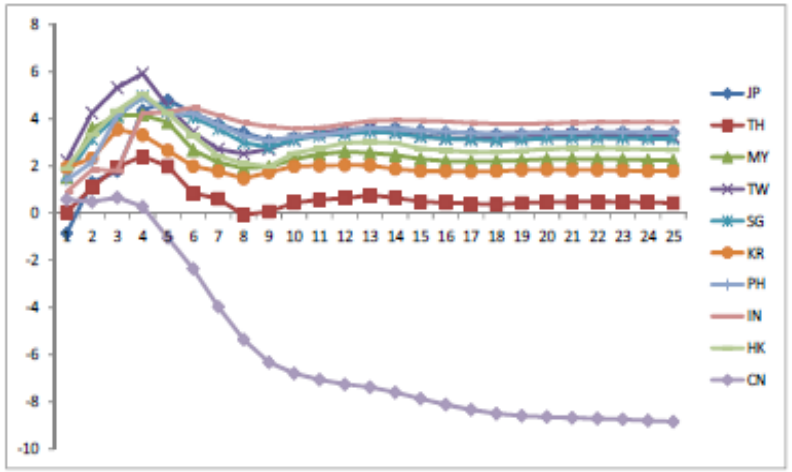
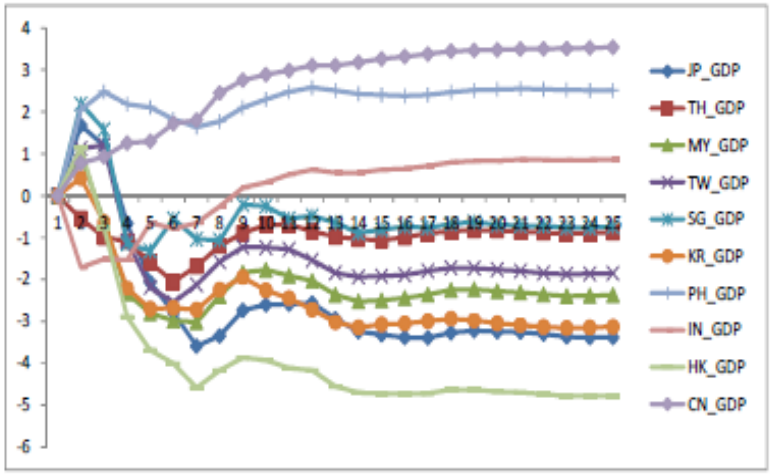
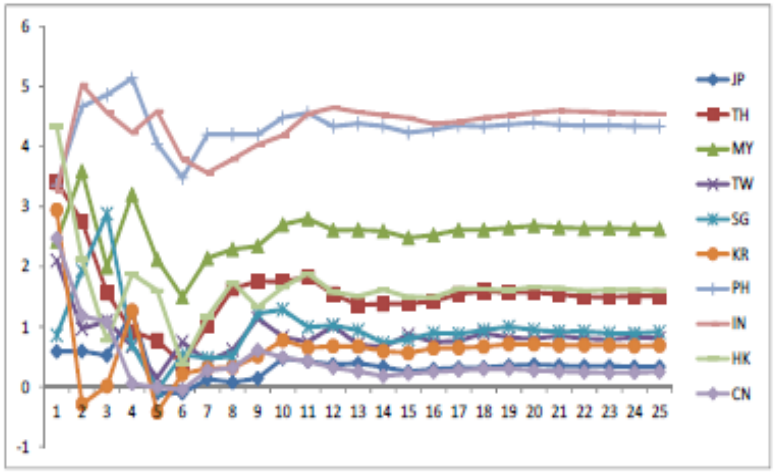


Figure 4.4: Impulse Responses to the nominal and real exchange rate shocks

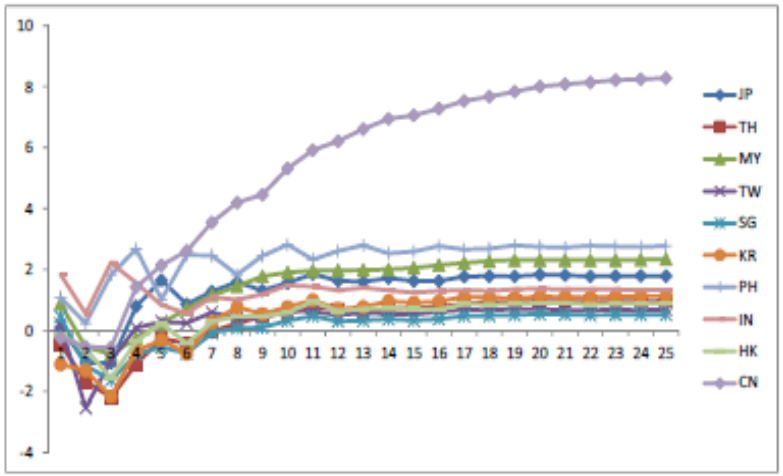
(a) Responses of GDP to Regional Nominal Shock



(b) Responses of INF to Regional Nominal Shock



(c) Responses of EXT to REX Shock



(d) Responses of IMT to REX Shock

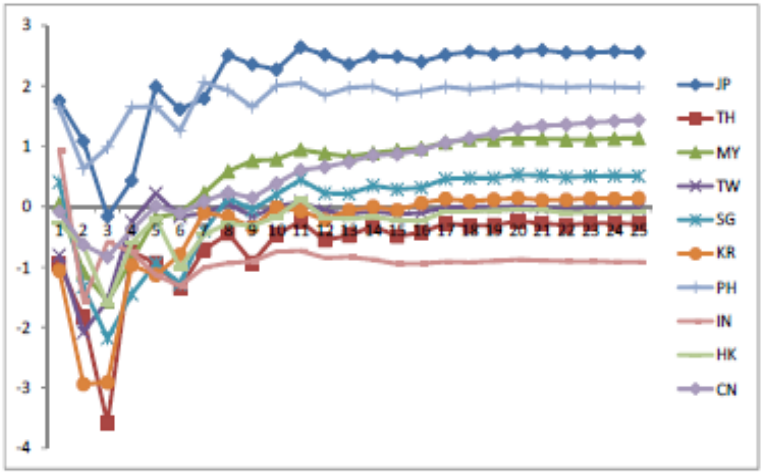
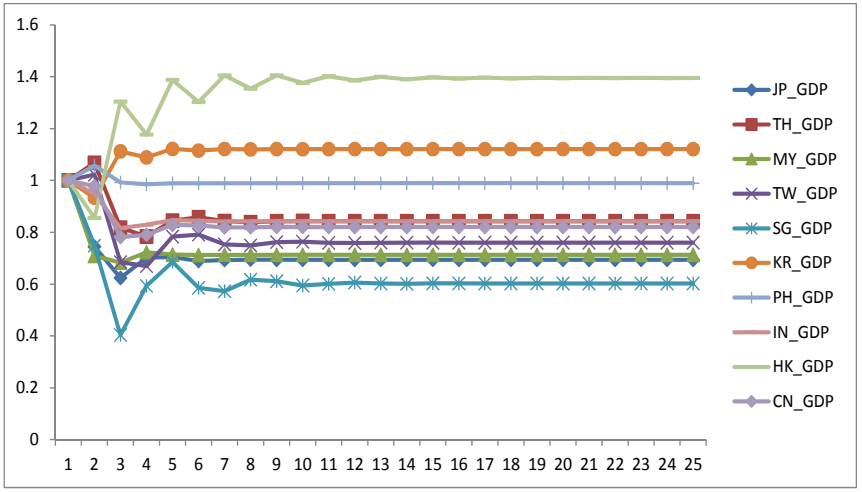
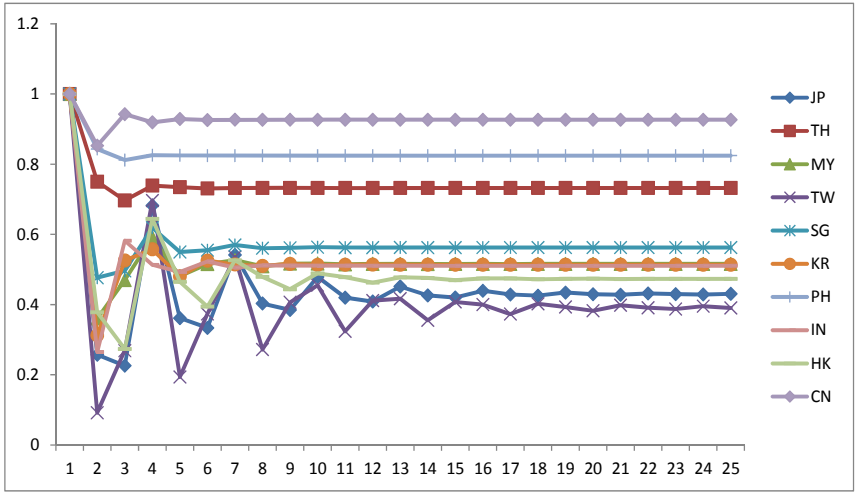


Figure 4.5: Impulse Responses to Idiosyncratic shocks

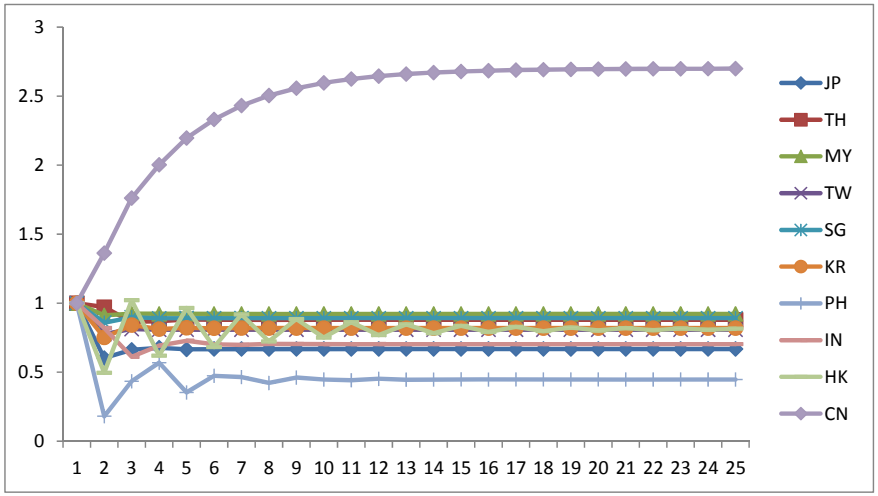
(a) Responses of GDP to Idiosyncratic factors



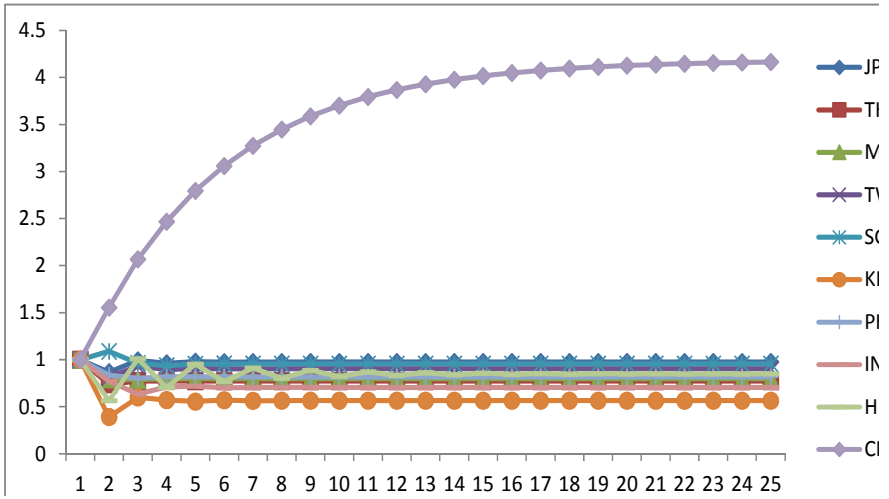
(b) Responses of INF to Idiosyncratic factors



(c) Responses of EXT to Idiosyncratic factors



(d) Responses of IMT to Idiosyncratic factors



Forecast error variance decomposition

Table 2.4: Variance decomposition at lag 8

	Oil	WRD	RGDP	REX	NOM	IDO
JP_GDP	7.32	41.22	38.70	4.92	7.12	0.72
TH_GDP	2.31	36.14	51.73	1.66	5.48	2.69
MY_GDP	7.66	43.87	32.57	3.43	11.12	1.34
TW_GDP	8.18	48.27	35.38	2.72	4.36	1.09
SG_GDP	4.27	54.32	37.68	0.79	2.25	0.69
KR_GDP	9.13	41.36	29.67	3.24	12.85	3.76
PH_GDP	7.40	30.90	42.20	10.93	6.75	1.83
IN_GDP	0.65	7.33	44.28	40.67	4.04	3.03
HK_GDP	12.04	52.39	15.37	1.25	16.44	2.51
CN_GDP	0.97	26.04	62.56	2.73	6.08	1.63
JP_REX	11.17	0.58	16.61	67.07	2.02	2.56
TH_REX	0.54	36.20	10.00	38.23	9.73	5.29
MY_REX	1.79	23.20	37.01	34.37	1.11	2.52
TW_REX	15.01	24.75	2.11	55.51	1.50	1.12
SG_REX	4.11	20.24	24.55	41.59	6.79	2.72
KR_REX	6.98	36.68	13.39	28.56	5.93	8.47
PH_REX	1.40	25.30	29.29	32.69	4.02	7.30
IN_REX	1.95	19.03	8.30	60.51	3.96	6.25
HK_REX	13.54	12.48	31.72	3.71	3.06	35.49
CN_REX	0.26	25.89	28.96	19.08	6.13	19.67
JP_INF	2.69	42.19	46.31	2.67	3.15	2.99
TH_INF	25.67	6.15	27.09	13.62	23.36	4.10
MY_INF	33.58	18.83	13.71	1.85	30.38	1.65
TW_INF	15.62	19.33	7.83	9.81	38.23	9.18
SG_INF	5.27	54.45	27.43	3.77	7.44	1.64
KR_INF	19.39	4.45	31.24	10.15	27.38	7.40
PH_INF	20.73	17.18	19.01	4.11	37.49	1.47
IN_INF	13.81	3.96	13.73	4.06	63.21	1.22
HK_INF	20.47	7.72	28.45	3.03	37.54	2.80
CN_INF	10.66	22.89	27.82	4.47	18.57	15.60

5. Conclusion

- **Regional and global factors explain the bulk of fluctuations in East Asia**
- **Except for two or three outliers, more synchronised than Europe prior to 1990 (e.g. Bayoumi and Eichengreen (1991))**
- **But, synchronised macroeconomic responses are only one (very crude) of the pre-conditions. See Europe! Note Shocks can differ *ex post* from *ex ante*.**
- **Fiscal policy put aside, very limited labour mobility is another obstacle.**
- **Possibly two or more monetary zones to start with, based on geographical and economic proximities. (Alan Meltzer's proposal for the troubled EMU)**
- **FP cannot be separated from MP! More so in times of crisis!**
- **Integration should occur sequentially and gradually. Getting the order of integration right is important.**