

The Effect of External Shocks on Macroeconomic Fluctuations: Implications for a Monetary Union in East Asia

Sato, K.¹, Z.Y. Zhang² and M. McAleer³

¹ Faculty of Economics, Yokohama National University, Japan

² School of Accounting, Finance and Economics, Edith Cowan University, Australia

³ Department of Applied Economics, National Chung Hsing University, and Econometric Institute, Erasmus University Rotterdam

Email: sato@ynu.ac.jp (Sato), zhaoyong.zhang@ecu.edu.au (Zhang)
and michael.mcaleer@gmail.com (McAleer)

Abstract: Recovering from the severe economic downturn during the currency crisis, East Asian countries have shown considerable economic growth again and regional integration appears to be accelerating. Such a deepening integration process recalls to us an interesting question as to whether a regional monetary union or a common currency unit can be established in East Asia. While the ongoing economic integration suggests the feasibility of regional monetary arrangements, a rigorous empirical investigation of this issue will be very necessary. In this paper we employ a structural VAR model with block exogeneity to comparatively investigate if external shocks originated from the US play a dominant role in influencing the macroeconomic fluctuations in East Asia during the sample period from 1978 to 2007. Our results indicate that the real output variable and inflation rate are highly correlated and statistically significant among the Asian NIEs and during both the whole sample period and the period after the financial crisis. The US real output growth was correlated significantly with that in Japan, Taiwan, Malaysia and Thailand during the period 1978-1987, but maintained significant correlation only with that of Hong Kong, Singapore and Taiwan during the post-crisis period. The real GDP growth in Japan has a significant correlation with the Asian NIEs and China during the post-crisis period, while the latter has only one significant correlation. This finding is consistent with the results from the correlation analysis of structural shocks using the conventional Blanchard and Quah (1989) technique. The results from the structural VAR model with block exogeneity show that the US shock and the Japanese shock are the dominant sources of disturbance in the region before the financial crisis, especially during the 1978-1987 period, both in terms of short run and long run. During the post-crisis period, it is found that the US shock has become the dominant source of the disturbance in most economies with the exception of the Chinese economy, while the Japanese influence has become decreased. The Chinese shock influence shows an increasing trend over time, but the size is still small and not compatible with that of the US shock. The world oil price shock has become increasingly important in influencing the stability of the real output growth in the region, most notably in the economies of China, Hong Kong, Singapore and Thailand. This indicates their increasing reliance on the world oil supply associated with their industrialization. The results also indicate that most of the East Asian economies have positive impulse responses to the external shocks originated from the United States through the different time periods, with the only exception of Indonesia during the post-crisis period. The impulse responses to the regional shock originated from China and Japan show an increasing trend, especially during the post crisis period, but the sizes are smaller and not compatible with that of the United States in all the time horizons. These findings imply that even though the regional integration appears to be deepening and accelerating especially after the recent financial crisis, the influence of the US shock is still playing a dominant role in real output fluctuations in the East Asian region. It is often pointed out that Japanese firms have been building a production network in East Asia through trade and investment, and also that China has grown rapidly and become a candidate of a regional key country. However, our result implies that the US influence in the region is still asymmetric and strong, and it is hard to conclude that shocks to the East Asian economies have become more regionally originated.

Keywords: Structural vector autoregression; Monetary union; External shocks; East Asia
JEL classification: F33; F36; F41

1. INTRODUCTION

Recovering from severe economic downturn during the currency crisis, East Asian countries¹ have shown considerable economic growth again and regional integration appears to be accelerating. Such a deepening integration process recalls to us an interesting question as to whether a regional monetary union or a common currency unit can be established in East Asia. While the ongoing economic integration suggests the feasibility of regional monetary arrangements, a rigorous empirical investigation of this issue will be very necessary.

There have been so far a number of studies examining the feasibility of forming a monetary union in East Asia (for instance, Bayoumi and Eichengreen, 1994, Bayoumi et al., 2000 and Chow and Kim, 2003). These studies typically explore whether the countries in question meet some of the pre-conditions set in the theory of optimum currency area. Recent studies, such as Cheung and Yuen (2005) and Sato and Zhang (2006), investigate the correlations in structural shocks and real output co-movements among the East Asian countries and find that some sub-groups of the countries are potential candidates for establishing a monetary union. However, these studies do not take into consideration whether the degree of correlations in structural shocks or real output co-movements have improved over time. Notably Zhang and Sato (2008) examine the time-varying correlation in structural shocks to assess the viability of forming a monetary union in Greater China area from a dynamic perspective. The advantage of this dynamic approach is that it will allow us not only to assess the dynamic process of shock correlation and convergence trend, but also to determine the shock correlation which is not caused by the “outside” economies. This is especially important when we assess the feasibility of forming a monetary union in the East Asian region given its unique dynamic integration process and business linkages with the United States. Indeed, our late findings also confirm the dynamic process and increasing correlations of both real output growth rates and structural shocks in the post-crisis period among some East Asian countries. It therefore remains an interesting question to ask whether or not the co-movements of macroeconomic variables in the region have been driven by the external shocks such as the US shocks. The economic influence of the United States in the East Asian region is better reflected in the saying, “when America sneezed, Japan and Europe used to catch a cold”. To determine the content of the US influence has important implications for establishing a regional monetary arrangement. Recently, there has been a growing literature analysing the effect of external shocks on the economic growth and the macroeconomic fluctuations in the emerging economies. IMF (2007), for instance, tackles a broad question of how far the emerging economies can decouple from the US economy, and investigates whether the US shocks affect business cycle fluctuations in some major currency areas including East Asia, Latin America, and Sub-Saharan Africa using various empirical methods such as a panel analysis, a structural VAR estimation and a dynamic factor model. Canova (2005), Genberg (2005) and Maćkowiak (2007) have done similar studies by adopting the VAR technique to examine the effect of the US monetary shocks or China’s impact on the emerging economies in East Asian and Latin America. However, most of these studies cover the period during the 1980s and the 1990s and could not fully catch the effect of the recent economic crises experienced by these emerging economies.

This paper aims at assessing whether the co-movements of macroeconomic variables in the region have been affected by the external shocks or driven by autonomous development of regional economies. In particular, we investigate which shocks have a dominant effect, shocks originated from the two regional key countries, i.e., Japan or China, or the ones from the United States. We first conduct a correlation analysis of the real output growth and domestic inflation among these economies to investigate the dynamic structural changes over time. We also assess the shock disturbances obtained by the Blanchard and Quah (1989) structural decomposition method to determine the trend of the shocks correlation. Then, we set up a structural VAR model with block exogeneity so that we can examine to what extent the US shocks has an influence on macroeconomic fluctuations in the East Asian economies, and if the external shocks dominate the shock disturbance or the internal shocks. Finally, the variance decomposition test and the impulse response function analysis are conducted to investigate the size of shocks and the speed of adjustment to shocks for the economies concerned. The results indicate that the US shocks are an important source of real output fluctuations in five East Asian countries, while the Japanese and Chinese shocks are comparatively less important. In addition, the impulse responses of real outputs to US shocks are positive and much larger in the five East Asian

¹ In this paper, East Asia is defined as the following 9 economies: Korea, Taiwan, Hong Kong, Singapore, Malaysia, Indonesia, Thailand, the Philippines, and Mainland China.

countries during the post-crisis period than the corresponding impulse responses to the Japanese and Chinese shocks, even though the Japanese firms have been building a production network in East Asia in the past few decades and China has emerged to be a trading nation and the world's manufacturing centre since the late 1990s. This has important implications for the feasibility of regional monetary arrangements in East Asia.

The remainder of this paper is organized as follows. In section 2, we discuss the analytical framework and methodology employed in the paper. Section 3 describes the data issue, and section 4 presents the results of empirical estimation. Section 5 provides some concluding remarks.

2. ANALYTICAL FRAMEWORK

To allow for the effect of external shocks on regional economies, let us consider the following near-VAR model with block exogeneity:²

$$\sum_{s=0}^p \begin{bmatrix} A_{11}(s) & A_{12}(s) \\ A_{21}(s) & A_{22}(s) \end{bmatrix} \begin{bmatrix} y_{1,t-s} \\ y_{2,t-s} \end{bmatrix} = \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{bmatrix},$$

where $A_{12}(s) = 0$ for each $s = 0, 1, \dots, p$, $y_{1,t}$ is a vector of variables external to the domestic country, and $y_{2,t}$ is a vector of macroeconomic variables in the domestic country. A vector of structural shocks, $\varepsilon_t = [\varepsilon_{1,t} \quad \varepsilon_{2,t}]'$, is uncorrelated with past y_{t-s} for $s > 0$ and satisfies $E[\varepsilon_t \varepsilon_t' | y_{t-s}, s > 0] = I$ and $E[\varepsilon_t | y_{t-s}, s > 0] = 0$. $\varepsilon_{1,t}$ is a vector of structural shocks of external origin and $\varepsilon_{2,t}$ that of domestic origin. The model is formulated separately for each East Asian economy that is assumed to be a small open economy. We impose the block exogeneity restriction, $A_{12}(s) = 0$ for each $s = 0, 1, \dots, p$, which indicates that domestic shocks, $\varepsilon_{2,t}$, have neither contemporaneous nor lagged effects on external variables, $y_{1,t}$.

A foreign block, $y_{1,t}$, includes three variables: the world oil price changes, and the real output growth in the United States and Japan. We also include China's real output growth instead of the Japanese one to analyze the effect of the emerging Chinese economy on the rest of the region. In the foreign block, it is assumed that the US and Japanese (or Chinese) real output growth rates do not affect the world oil price changes either contemporaneously or with lags. It is further assumed that shocks to the US real output growth (the US shock) affects contemporaneously the real output growth in Japan or China, but not vice versa. A country-specific block, $y_{2,t}$, includes two variables: the real output growth and the domestic inflation. In the country-specific block, we impose the long-run zero restrictions like Blanchard and Quah (1989) where only a shock to the first variable (real output growth), i.e., the domestic supply shock, affect the real output growth in the long-run; and both the supply shock and the shock to the second variable (domestic inflation), i.e., the domestic demand shock, affect the domestic inflation in the long-run. Thus, we use the SUR estimation with the above block exogenous assumption to identify structural shocks by imposing both contemporaneous and long-run restrictions. We use RATS 6.0 for estimation, and choose one lag for this near-VAR system due to the small sample size.

3. DATA

We use the real GDP and consumer price index (CPI) series as proxies for the real output and the domestic price, respectively. The world oil price index in terms of the US dollar is also included in a near-VAR model to allow for the effect of the world oil price shock on domestic real output and prices. All data are quarterly, expressed in natural logarithms. Seasonality is adjusted using the Census X12 method. The sample period covers 1978Q1-2007Q4 except for the Hong Kong CPI (1980Q4-2007Q4)

² See Cushman and Zha (1997), Zha (1999), and Maćkowiak (2007) for an analysis using the near-VAR model with block exogeneity.

and the Chinese CPI (1986Q1-2007Q4). The major data sources are IMF, *International Financial Statistics* (IFS), CD-ROM edition and the CEIC Global Database as well as China Monthly Statistics. The whole sample period is further divided into three sub-samples, i.e., 1978Q1-1987Q4, 1988Q1-1996Q4, and 1999Q1-2007Q4, to better capture the dynamic evolution process of the shocks correlation over the sample period. Moreover, data for 1997-98 is excluded from the sample to eliminate the possible impact of the Asian currency crisis. Due to the small sample size, we do not perform cointegration analysis. We employ a first-difference VAR model to ensure stationarity of variables,

4. EMPIRICAL RESULTS

We have conducted a correlation analysis of the variables among the concerned economies and also calculated the correlation coefficients of the identified structural shocks following the Blanchard and Quah (1989) structural decomposition method. Due to the space limitation, the results are not reported, but available upon request from the authors. The results from correlation analysis indicate that the real output variable and inflation rate are highly correlated and significant at the 5% significant level mostly among the Asian NIEs and during both the whole sample period and the period after the financial crisis. In particular, the correlation coefficients of the real output growth among the economies of Hong Kong, Korea, Singapore and Taiwan range from 0.20 to 0.51 during the period 1978-2007 and from 0.34 to 0.71 during the post-crisis period in 1999-2007. Before the financial crisis, Japan's real output growth is found to be correlated only with that of Korea. During the post-crisis period, it has been found to be correlated with that of the four East Asian Tigers plus China and Malaysia, with the coefficient ranging from 0.24 the lowest with Korea to 0.36 the highest with China. The change of the correlation pattern for the Chinese economy is not as notable as one might expect, increased from a null significant correlation before the crisis to only one significant correlation with Japan while keeping a coefficient of 0.27 with Hong Kong and 0.16 with Singapore. The US real output growth was correlated significantly with that in Japan, Taiwan, Malaysia and Thailand during the period 1978-1987, but maintained significant correlation only with that of Hong Kong, Singapore and Taiwan. The evolution pattern of the correlation coefficients for the real output growth in the region is a reflection of the deepening regional integration through trade and investment and policy coordination during the post-crisis period. Our results from the shocks correlation a la Blanchard and Quah (1989) also confirm that the degree of correlation in supply shocks has improved substantially during the post-crisis period.

Table 1. Variance Decomposition of Real GDP Growth Rate due to US and Japanese Shocks

	Horizon	KR	TW	HK	SG	MY	ID	TH	PH	CH
A. 1978Q1-1987Q4										
	(Quarters)									
Oil shock	1-12	5.8	1.7	3.0	1.8	9.0	5.1	2.0	3.0	-
	13-24	6.5	1.9	2.9	2.0	10.7	5.6	2.1	3.1	-
US shock	1-12	2.8	17.0	10.4	0.5	7.8	5.6	16.8	11.9	-
	13-24	3.0	18.2	11.6	0.6	7.8	6.0	16.7	12.8	-
Jp shock	1-12	10.2	7.5	31.2	11.6	0.6	11.0	6.7	3.5	-
	13-24	10.6	7.5	33.4	12.7	0.6	11.2	7.0	3.8	-
B. 1988Q1-1996Q4										
Oil shock	1-12	8.9	11.3	10.9	15.6	6.9	6.5	0.7	5.8	2.0
	13-24	9.1	11.4	11.1	16.1	6.9	6.6	0.7	6.3	2.1
US shock	1-12	11.6	2.0	8.8	2.9	1.2	9.4	1.3	10.1	3.5
	13-24	12.4	2.1	8.5	3.1	1.2	9.4	1.5	11.2	3.6
Jp shock	1-12	5.0	5.0	16.8	18.6	0.3	6.1	1.3	2.1	21.5
	13-24	5.2	5.1	18.0	19.7	0.4	6.7	1.3	2.1	22.0
C. 1999Q1-2007Q4										
Oil shock	1-12	3.1	4.3	23.8	17.7	6.5	7.1	17.0	8.5	10.1
	13-24	3.4	4.7	23.6	17.9	6.9	7.0	16.7	9.3	10.0
US shock	1-12	23.6	45.3	28.2	25.4	31.1	3.7	3.2	13.5	2.0
	13-24	25.8	46.2	28.7	25.4	33.5	4.2	3.2	15.1	2.1
Jp shock	1-12	4.1	3.0	9.4	4.5	8.1	9.4	0.1	8.9	3.7
	13-24	4.0	3.0	9.6	5.0	8.0	9.3	0.1	9.8	3.8

Note: "1-12" denotes the average between 1 quarter after a shock and 12 quarters after a shock. "13-24" denotes the average between 13 quarters after a shock and 24 quarters after a shock.

The evolution of the inflation rates correlation shows a slightly different pattern from the real output growth. All the concerned economies except China and the Philippines are significantly correlated in their domestic inflation rates during the period 1978-1987, and become less so since the late 1980s. In contrast, China and the Philippines have become increasingly correlated in inflation rates with the rest of the East Asian economies and the United States since the late 1980s. In particular, the number of significant correlation of the inflation rates for China has gone up to six, with only one negative correlation coefficient with Indonesia, during the post-crisis period. This finding reflects the increasing influence of the emerging Chinese economy in the region.

Table 2. Results of Impulse Responses of Domestic Output to External Shocks of One Standard Deviation: US and Japanese Shocks

	Horizon	KR	TW	HK	SG	MY	ID	TH	PH	CH
A. 1980Q1-1988Q4										
Oil shock	1-4	-0.23	0.05	-0.08	-0.02	0.52	0.05	-0.30	0.58	-
	1-12	-0.55	0.07	-0.03	0.09	0.94	0.18	-0.27	0.60	-
	13-24	-0.82	0.04	0.00	0.10	1.23	0.25	-0.16	0.55	-
US shock	1-4	0.09	0.53	0.06	0.10	0.52	0.30	0.50	-1.18	-
	1-12	0.12	0.73	0.00	0.18	0.53	0.39	0.48	-1.66	-
	13-24	0.13	0.86	-0.03	0.22	0.52	0.43	0.48	-1.96	-
Jp shock	1-4	0.35	-0.33	-0.32	-0.25	0.09	-0.41	0.48	-0.51	-
	1-12	0.52	-0.33	-0.53	-0.55	0.02	-0.44	0.53	-0.63	-
	13-24	0.68	-0.32	-0.67	-0.72	-0.03	-0.45	0.55	-0.68	-
B. 1989Q1-1996Q4										
Oil shock	1-4	-0.19	0.22	-0.39	-0.28	0.28	0.28	0.17	-0.36	-0.05
	1-12	-0.14	0.23	-0.51	-0.33	0.30	0.33	0.18	-0.46	0.05
	13-24	-0.12	0.24	-0.58	-0.36	0.30	0.35	0.18	-0.51	0.12
US shock	1-4	-0.32	0.00	-0.27	0.06	-0.14	0.29	0.08	0.36	0.25
	1-12	-0.40	-0.01	-0.23	0.09	-0.16	0.24	0.11	0.49	0.21
	13-24	-0.44	-0.02	-0.18	0.10	-0.17	0.22	0.12	0.56	0.17
Jp shock	1-4	0.17	-0.07	-0.44	-0.02	-0.06	-0.21	-0.21	0.17	-0.70
	1-12	0.17	-0.06	-0.57	0.02	-0.06	-0.23	-0.22	0.19	-0.81
	13-24	0.17	-0.05	-0.62	0.04	-0.07	-0.25	-0.22	0.20	-0.87
C. 1999Q1-2006Q4										
Oil shock	1-4	-0.07	-0.17	0.60	-0.13	0.30	0.19	0.39	-0.21	0.12
	1-12	-0.13	-0.22	0.73	-0.27	0.37	0.20	0.41	-0.23	0.12
	13-24	-0.16	-0.25	0.84	-0.31	0.41	0.21	0.42	-0.24	0.11
US shock	1-4	0.37	1.15	0.97	1.29	0.48	-0.08	0.10	0.29	0.05
	1-12	0.49	1.35	1.23	1.38	0.55	-0.08	0.09	0.42	0.07
	13-24	0.56	1.46	1.47	1.40	0.58	-0.08	0.08	0.49	0.07
Jp shock	1-4	0.19	0.30	0.53	0.47	0.16	0.23	-0.02	0.22	0.10
	1-12	0.22	0.37	0.62	0.60	0.15	0.23	-0.03	0.31	0.11
	13-24	0.24	0.41	0.68	0.64	0.15	0.23	-0.03	0.35	0.12

Note: The impulse responses are percentage deviations. "1-4" denotes the average between 1 quarter after a shock and 4 quarters after a shock. "1-12" denotes the average between 1 quarter after a shock and 12 quarters after a shock. "13-24" denotes the average between 13 quarters after a shock and 24 quarters after a shock.

We now turn to the variance decomposition and the impulse response analysis to identify the dominant shock influence and the speed of adjustment. Since the estimated structural shocks are assumed to have unit variances in the structural VAR method, their size and adjustment speed can be inferred by analyzing the associated impulse response functions (Bayoumi and Eichengreen, 1994). In this study, we use different horizons to investigate the effect of a unit shock on changes in real GDP and CPI as a measure of the size of different shocks. The speed of adjustment is measured by the response after a horizon average between one and four-quarter and also between one and twelve-quarter. The larger is the size of the shocks, the more disruptive will be the effects on an economy. Tables 1 and 2 presents the results of variance decomposition in real output growth and the impulse response of real output to the oil price shock, US and Japanese shocks. Due to the space limitation, we report only the results of

variance decomposition in real output growth with the US shocks and Japanese shocks. The results for inflation rates and for the Chinese shock are available upon request.

We find that the US shock and the Japanese shock are the dominant sources of disturbance in the region before the financial crisis, especially during the 1978-1987 period, both in terms of short run and long run. The influence of the US shock is most visible in the economies of Taiwan, Thailand, the Philippines, while the Japanese shock is mostly noted in Hong Kong, Indonesia, Korea, and Singapore. This finding seems to be consistent with the two countries' business and investment locations in the region. It is noted that after the financial crisis, the US shock has become the dominant source of the disturbance in most economies with the exception of the Chinese economy, while the Japanese influence has become decreased. Although not reported, the Chinese shock influence shows an increasing trend over time, but the size is still small and not compatible with that of the US shock. From Table 1, we also note that the world oil price shock has become increasingly important in influencing the stability of the real output growth in the region, most notably in the economies of China, Hong Kong, Singapore and Thailand. This indicates their increasing reliance on the world oil supply associated with their industrialization. It is also interesting to note that Indonesia and Thailand are less affected by external shocks, but the Philippines are more affected by the Chinese shock. The results of the variance decomposition for inflation show that the world oil price shock is an important source of price fluctuations in most economies, followed by the US shock. The Chinese influence in domestic price level is persistent and mostly noted in Hong Kong, which is a clear reflection of the high degree of economic integration between the two economies.

As the real output co-movements and business cycle synchronization are viewed as one of the most crucial precondition for forming an optimum currency area, we now turn to the effect of external shocks on real output growth of the East Asian economies. It can be seen from Table 2 that most of the East Asian economies have positive impulse responses to the external shocks originated from the United States through the different time periods, with the only exception of Indonesia post the financial crisis. The impulse responses to the regional shock originated from China and Japan show an increasing trend, especially during the post crisis period, but the sizes are smaller and not compatible with that of the United States in all the time horizons. These findings imply that even though the regional integration appears to be deepening and accelerating especially after the recent financial crisis, the influence of the US shock is still playing a dominant role in real output fluctuations in the East Asian region.

5. CONCLUDING REMARKS

In this paper we employed a structural VAR model with block exogeneity to comparatively investigate if external shocks originated from the US play a dominant role in the macroeconomic fluctuations in East Asia during the sample period from 1978 to 2007. We find that the real output variable and inflation rate are highly correlated and statistically significant among the Asian NIEs and during both the whole sample period and the period after the financial crisis. The US real output growth was correlated significantly with that in Japan, Taiwan, Malaysia and Thailand during the period 1978-1987, but maintained significant correlation only with that of Hong Kong, Singapore and Taiwan during the post-crisis period. The real GDP growth in Japan has a significant correlation with the Asian NIEs and China during the post-crisis period, while the latter has only one significant correlation. This finding is consistent with the results from the correlation analysis of structural shocks using the conventional Blanchard and Quah (1989) technique.

The results from the structural VAR model with block exogeneity show that the US shock and the Japanese shock are the dominant sources of disturbance in the region before the financial crisis, especially during the 1978-1987 period, both in terms of short run and long run. During the post-crisis period, it is found that the US shock has become the dominant source of the disturbance in most economies with the exception of the Chinese economy, while the Japanese influence has become decreased. The Chinese shock influence shows an increasing trend over time, but the size is still small and not compatible with that of the US shock. The world oil price shock has become increasingly important in influencing the stability of the real output growth in the region, most notably in the economies of China, Hong Kong, Singapore and Thailand. This indicates their increasing reliance on the world oil supply associated with their industrialization. The results also indicate that most of the East Asian economies have positive impulse responses to the external shocks originated from the United States through the different time periods, with the only exception of Indonesia during the post-

crisis period. The impulse responses to the regional shock originated from China and Japan show an increasing trend, especially during the post crisis period, but the sizes are smaller and not compatible with that of the United States in all the time horizons. These findings imply that even though the regional integration appears to be deepening and accelerating especially after the recent financial crisis, the influence of the US shock is still playing a dominant role in real output fluctuations in the East Asian region. It is often pointed out that Japanese firms have been building a production network in East Asia through trade and investment, and also that China has grown rapidly and become a candidate of a regional key country. However, our result implies that the US influence in the region is still asymmetric and strong, and it is hard to conclude that shocks to the East Asian economies have become more regionally originated.

ACKNOWLEDGEMENTS

This study is financially supported by the Japan Society for the Promotion of Science through the Grant-in-Aid for Scientific Research (S), 20223003.

REFERENCES

- Bayoumi, T. and B. Eichengreen, 1994, "One Money or Many? Analyzing the Prospects for Monetary Unification in Various Parts of the World", *Princeton Studies in International Finance*, No.16.
- Bayoumi, T., B. Eichengreen and P. Mauro, 2000, "On Regional Monetary Arrangements for ASEAN", *Journal of the Japanese and Inter-national Economies*, 14, pp.121-148.
- Blanchard, O.J. and D. Quah, 1989, "The Dynamic Effects of Aggregate Demand and Supply Disturbances", *American Economic Review*, 79, pp.655-673.
- Canova, Fabio, 2005, "The Transmission of US Shocks to Latin America," *Journal of Applied Econometrics*, 20, pp.229-251.
- Cheung, Y.-W. and J. Yuen, 2005, "The Suitability of a Greater China Currency Union," *Pacific Economic Review*, 10(1), pp.83-103.
- Chow, H.K. and Y. Kim, 2003, "A Common Currency Peg in East Asia? Perspectives from Western Europe," *Journal of Macroeconomics*, 25, pp.331-350.
- Cushman, David O. and Tao Zha, 1997, "Identifying Monetary Policy in a Small Open Economy Under Flexible Exchange Rates," *Journal of Monetary Economics*, 39, pp.433-448.
- Genberg, Hans, 2005, "External Shocks, Transmission Mechanisms and Deflation in Asia," BIS Working Papers, No.187, Bank for International Settlements.
- International Monetary Fund (IMF), 2007, "Decoupling the Train? Spillovers and Cycles in the Global Economy," *World Economic Outlook*, April, pp.121-160.
- Japan External Trade Organization (JETRO), 2007, *2007 JETRO White Paper on International Trade and Foreign Direct Investment*, Japan External Trade Organization.
- Maćkowiak, Bartosz, 2007, "External Shocks, U.S. Monetary Policy and Macroeconomic Fluctuations in Emerging Markets," *Journal of Monetary Economics*, 54, pp.2512-2530.
- Rodriguez, R.N., 1982, "Correlation", in S. Kotz and N.L. Johnson (eds.), *Encyclopedia of Statistical Sciences*, Vol.2, Wiley, pp.193-204.
- Sato, Kiyotaka and Zhaoyong Zhang, 2006, "Real Output Co-movements in East Asia: Any Evidence for a Monetary Union?" *The World Economy*, 29(12), pp.1671-1689.
- Zha, Tao, 1999, "Bloc Recursion and Structural Vector Autoregression," *Journal of Econometrics*, 90, pp.291-316.
- Zhang, Zhaoyong and Kiyotaka Sato, 2008, "Whither A Currency Union in Greater China?" *Open Economies Review*, 19(3), pp.355-370.