



## The feasibility analysis and path selection of China-ASEAN regional monetary cooperation

Wenli Ding, Shuai Yuan\* and Donghui Yang

*School of Economic and Management, Yunnan Normal University, Kunming, Yunnan, China*

---

### ABSTRACT

*The financial crisis of Southeast Asia in 1997 and the Global financial crisis in 2008 have had significant effect on China and ASEAN, which made them realize the importance of monetary cooperation. Based on VAR model, the paper used the relevant data of China and ASEAN and tried to examine economic impact correlation and the reaction speed by analyzing the symmetry of economic impact and the impulse response function separately. The conclusion of the feasibility of monetary cooperation between China and ASEAN was then made and an appropriate approach was further suggested by comparing European Union's relevant data.*

**Keywords:** Monetary Cooperation; Currency Path; Impulse Response Function; Symmetry of Economic Impact; VAR.

---

### INTRODUCTION

Economic globalization has had a rapid development since 1970s, which accelerates the process of regional economic integration. Meanwhile, inter-regional cooperation increasingly deepens. As the top level of inter-regional cooperation, monetary cooperation arose at the right moment, and the emergence of Euro in 1999 further played an exemplary role for monetary cooperation. However, being subject to US dollar, China and ASEAN suffered dramatic loss in the financial crisis of Southeast Asia and global financial crisis, and thus these countries realized the importance of monetary cooperation to the stability of regional development. Compared to US dollar and Euro, monetary cooperation between China and ASEAN will bring them into an advantage position in the international competition and promote regional economic integration at the same time. Therefore, strengthening monetary cooperation between China and ASEAN becomes significantly important. So how to choose an appropriate model and a feasible approach to carry out such cooperation is an important problem. This paper seeks to examine the feasibility and approach of China-ASEAN regional monetary cooperation, and provides some enlightenment on the two-area's future monetary cooperation [1].

### 2. Literature Review

#### 2.1 Theory of Optimal Currency Areas

Optimal currency area refers to the region in which a unified currency or several exchangeable currencies are used as a common payment. The exchange rate remains stable within the area, but floats outside the area.

The Exogenous Theory of the Theory of Optimal Currency Areas was first put forward by the Father of Euro – Robert Mundell. However, the early Theory of Optimal Currency Areas is based on all kinds of single standards, and these single standards are exogenous.

The Endogenous Theory of the Theory of Optimum Currency Area started analyzing the issues in the currency areas

dynamically. Frankel and Rose(1997) first proposed the concept of endophytism. They believed that endophytism, trade openness, and economic symmetry were the standards of the optimum currency areas, which were endogenous in the currency exchange rate. Therefore, one country could meet the standards after joining the currency area rather than before the participation. On the contrary, Krugman (1999) argued that the economic integration caused the cost deduction of production and trade and deepened the professionalism. One country might be more likely to suffer from the asymmetry of industry, and therefore be less likely to meet the standards of the optimum currency areas.

## 2.2. The Asymmetry of Economic Impact

Eichengreen and Bayoumi (1996) used SVAR model to analyze the impact scope and frequency in the currency area. They also used the function of impulse response to measure the impact time of economic entities. Through classifying the impact by demand and supply, they drew a conclusion that the Pacific Rim had potential to become an optimum currency area.

Haibo Huang and Aizong Xiong (2009) believed that compared with the cooperation between Japan and Korea, it was more likely for China to cooperate with ASEAN countries and build a currency union, for the asymmetry of economic impact was matured in the ASEAN countries.

## 2.3. Conclusion

On the whole, the previous research divided currency cooperation into three parts: exogenous standard, endogenous standard, and the asymmetry of economic impact. Scholars always took exogenous standard as a reference when studying the endogenous standard. They also loosen endogenous standard. The research showed the advantages of currency cooperation outweigh the disadvantages. Concerning the asymmetry of economic impact, since the research showed that the difference about correlation is huge, building “sub-currency area” will meet the reality needs of China and ASEAN countries.

## 3. Data and VAR methodology

The paper based on VAR theory tries to establish a VAR Model containing three endogenous variables. These three endogenous variables represent supply shocks, demand shocks and monetary shocks. The paper tries to analyze the correlation coefficient of three endogenous variable through symmetry of economic shocks. Meanwhile, the paper make use of impulse response function to detect the size of economic shocks and its speed of response, which will lay the foundation of the feasibility and the path of monetary cooperation.

### 3.1 Index selection and Data description

To identify these three impacts, the paper chooses real GDP to detect supply shocks, the inflation rate to measure demand shocks, real interest rates to identify monetary shocks. Considering the integrity of the data, the paper finally chooses relevant annual data of China, Hong Kong, Macao, Indonesia, Malaysia, the Philippines, Thailand, Singapore and Laos these nine countries and regions ranging from 1989-2012. The data mainly comes from The World Bank, The Asian Development Bank and International Monetary Fund, etc[2-5].

### 3.2 Model

We establish 3 ternary n order VAR Model according to the information, the formula is:

$$C_0 S_t = \alpha_1 S_{t-1} + \alpha_2 S_{t-2} + \dots + \alpha_n S_{t-n} + \varepsilon_t, t = 1, 2, 3, \dots, T$$

the  $S_t$  is 3\*1 order column of endogenous variable, namely  $S_t = [Y_t, I_t, R_t]^T$ ,  $Y_t$ ,  $I_t$ ,  $R_t$  respectively represent real GDP, inflation rate and real interest rates.  $C_0$  is  $S_t$ 's corresponding coefficient matrix.  $\alpha_1, \alpha_2, \dots, \alpha_n$  is lagged endogenous variable coefficient matrix,  $\varepsilon_t$  is interference item. If VAR is effective the matrix  $C_0$  must be reversible. To simplify VAR, we set  $\beta_i = C_0^{-1} \alpha_i$ , To sum up we finally get a simplified 3\*n order VAR Model:

$$S_t = \beta_1 S_{t-1} + \beta_2 S_{t-2} + \dots + \beta_n S_{t-n} + \mu_t, t = 1, 2, 3, \dots, T$$

## 4. The Feasibility Empirical Analysis

### 4.1 Co-integration Test

Before the feasibility analysis, co-integration test is firstly applied to observe the stability. The paper uses ADF test as co-integration test. As some data of inflation rate and real interest rate was negative, so only the original number was used. ADF test results were shown in Table1.

Table1. ADF Test

CR	Variable	ND	(C,T,L)	ADF Value	P Value	5% CV
China	Y	0	(0,0,1)	2.7962	0.0115	-1.9583
	I	1	(0,0,1)	-3.9217	0.0011	-3.0199
	R	0	(0,0,1)	-2.2127	0.0394	-1.9583
Hong Kong	Y	1	(0,0,1)	-2.6209	0.0179	-3.0199
	I	0	(0,0,1)	-2.1045	0.0489	-1.9583
	R	1	(0,0,2)	-2.3771	0.0312	-3.0294
Macao	Y	2	(0,0,2)	-4.3939	0.0005	-3.6746
	I	1	(0,0,1)	-3.5057	0.0027	-3.0199
	R	1	(0,0,1)	-3.1764	0.0055	-3.0199
Indonesia	Y	1	(0,0,1)	-3.6104	0.0022	-3.0199
	I	1	(0,0,1)	-4.7006	0.0002	-3.0199
	R	0	(0,0,1)	-2.1590	0.0438	-1.9583
Malaysia	Y	1	(0,0,1)	-3.1864	0.0066	-3.0521
	I	1	(0,0,2)	-3.4332	0.0037	-3.0294
	R	1	(0,0,2)	-3.5549	0.0029	-3.0294
Philippines	Y	1	(0,0,1)	-2.3181	0.0361	-3.0521
	I	1	(0,0,2)	-4.2127	0.0008	-3.0294
	R	1	(0,0,2)	-2.6329	0.0181	-3.0199
Singapore	Y	2	(0,0,1)	-3.9519	0.0019	-3.7347
	I	0	(0,0,1)	-2.3000	0.0330	-1.9583
	R	1	(0,0,2)	-3.0884	0.0075	-3.0294
Thailand	Y	1	(0,0,1)	-2.6283	0.0199	-3.0521
	I	1	(0,0,2)	-3.6772	0.0022	-3.0294
	R	1	(0,0,2)	-3.2189	0.0057	-3.0294
Laos	Y	1	(0,0,1)	-2.5938	0.0189	-3.0199
	I	0	(0,0,1)	-2.1987	0.0405	-1.9583
	R	1	(0,0,2)	-2.3771	0.0312	-3.0294

"C, T, L" respectively represent constant term, trends and lag order number. "CR, ND, CV" respectively refers to countries and regions, number of difference and critical value. As all the data has passed the test so we can move to the next step.

#### 4.2 The Impact Correlation Analysis

According to the sequence that price influences output and output further influences monetary, the variable order as I, Y and R is determined. Then based on AIC and SC standards, "2" is selected as the lag order number. The interference item and estimated coefficient matrix are acquired. Such matrix estimated value is the economic shocks sequences economies face. Thus the correlation of supply shocks, demand shocks and monetary shocks are calculated.

##### 4.2.1 Correlation Analysis of Supply Shocks

Table2. Correlation Analysis of Supply Shocks

CR	China	HK	Macao	Indon	Malay	Phili	Singa	Thail
HongKong	0.921							
Macao	0.968	0.886						
Indonesia	0.916	0.799	0.967					
Malaysia	0.977	0.922	0.985	0.962				
Philippines	0.980	0.921	0.986	0.950	0.988			
Singapore	0.973	0.970	0.966	0.906	0.979	0.983		
Thailand	0.901	0.842	0.967	0.976	0.961	0.957	0.930	
Laos	0.963	0.870	0.993	0.982	0.986	0.986	0.957	0.975

As shown in Table2, the correlation degree of supply shocks among these countries or regions was very high, which indicated that these countries had similar economic growth patterns and economic structures. So they have had basic conditions to carry out a higher level of policy coordination and monetary cooperation.

##### 4.2.2 Correlation Analysis of Demand Shocks

As shown in Table3, compared with supply shocks, the correlation of demand shock was much smaller. The correlation between China and HK, Macao, Singapore, and Thailand was significant. So if HK, Macao, Singapore and Thailand suffer from economic shocks, its complementary effect will be greater than the substitution effect. But for other countries, the situation will be the opposite. So the correlation between China and other countries except HK, Macao, Singapore and Thailand was not significant and even negative.

**Table3. Correlation Analysis of Demand Shocks**

CR	China	HK	Macao	Indon	Malay	Phili	Singa	Thail
HongKong	0.559							
Macao	0.571	0.709						
Indonesia	-0.307	-0.131	-0.374					
Malaysia	0.211	0.000	0.075	0.389				
Philippines	0.071	0.376	0.065	0.684	0.319			
Singapore	0.474	0.464	0.436	-0.265	0.129	0.002		
Thailand	0.361	0.534	0.377	0.444	0.423	0.637	0.400	
Laos	-0.359	-0.222	-0.407	0.531	0.039	0.448	-0.504	-0.230

#### 4.2.3 Correlation Analysis of Monetary Shocks

As shown in Table4, the correlation degree of monetary shocks is between supply shocks and demand shocks. The correlation between China and HK, Macao, Malaysia, Thailand and Laos is significant, which indicated that these countries have had the foundation for further monetary cooperation and the cost is smaller than fiscal policy coordination.

**Table4. Correlation Analysis of Monetary Shocks**

CR	China	HK	Macao	Indon	Malay	Phili	Singa	Thail
HongKong	0.432							
Macao	0.624	0.732						
Indonesia	-0.185	-0.333	-0.389					
Malaysia	0.364	-0.198	0.147	0.418				
Philippines	-0.042	-0.308	-0.308	0.826	0.461			
Singapore	0.484	0.356	0.437	-0.178	0.211	-0.298		
Thailand	0.343	-0.086	0.273	0.461	0.602	0.431	0.338	
Laos	0.432	1.000	0.732	-0.333	-0.198	-0.308	0.356	-0.086

#### 4.3 Analysis of Impulse Response Function

Original economic shocks have standardized orthogonal units matrix according to VAR Model assumption. So we can detect the impact scale and speed of response through impulse response functions. If the impact scale is small, the resistance will be small, and vice versa. If the response speed is fast, the hidden cost of monetary cooperation will be less, and vice versa.

The paper defines impact scale as a ratio of economic shocks unit changes and the variable first 12 period cumulative effect. Reaction speed is defined as a ratio of the economic shocks variable first 2 period cumulative effects compared with the variable first 12 period cumulative effect. As all unit roots are within the unit circle, all units are stable, the data passes AR test. The data are analyzed through impulse response function directly, and the outcome was shown in Table5.

**Table5. China-ASEAN Economic Impact and Reaction Speed**

CR	Supply Shocks		Demand Shocks		Monetary Shocks	
	Scale	Speed	Scale	Speed	Scale	Speed
China	0.009	0.685	0.021	0.918	0.013	0.937
HongKong	0.023	0.776	0.016	0.947	0.022	0.961
Macao	0.009	0.723	0.015	0.932	0.037	0.969
Indonesia	0.027	0.842	0.083	0.989	0.054	0.893
Malaysia	0.021	0.833	0.062	0.973	0.013	0.971
Philippines	0.013	0.981	0.066	0.979	0.037	0.955
Singapore	0.021	0.701	0.039	0.986	0.005	0.922
Thailand	0.004	0.867	0.033	0.999	0.008	0.983
Laos	0.023	0.638	0.025	0.894	0.017	0.911
Average	0.015	0.705	0.036	0.862	0.021	0.850

The average value refers to the arithmetic mean, according to the result of table 6, if China and ASEAN countries start monetary cooperation, there must be some resistance due to larger impact scale; However, as the speed of response is fast, the implicit cost of monetary cooperation is small.

On the whole, according to the outcome of empirical results, currently the correlation coefficient of economic impact in China and ASEAN is relatively significant. Meanwhile, it has a relatively smaller impact scale and quicker reaction speed, so monetary cooperation is feasible for China and ASEAN countries.

#### 5. The Path Selection of China-ASEAN Regional Monetary Cooperation

Currently, there exist three paths for China-ASEAN regional monetary cooperation: monetary union model, multiple

monetary union and dominant currency regionalization mode. Because the process of RMB internationalization has not been ready for dominant currency regionalization model yet, choice will be made between the former two paths. Moreover, as the course of China-ASEAN regional monetary cooperation lags behind that of the Euro-zone, it will be very helpful to take similar process of Euro-zone countries as a mirror. Therefore, this paper selects data since 1988 when Delors restarted European currency union, and compare relevant annual data of Germany, France, Italy, Portugal, Austria, Belgium, Holland, Greece and Spain ranging from 1988 to 1999. The methodology was the same as previous[6].

Firstly, the symmetry of economic shocks in these nine Euro-zone countries is calculated. It showed that compared with China and ASEAN countries, their correlation of supply shocks is smaller but demand supply shocks is larger, which indicated that the differentiation of Euro-zone countries' productive structure was significant and the complementary effect outweighed the substitution effect. Also, the correlation of monetary impact is significantly high, which demonstrated that the explicit cost of monetary cooperation for Euro-zone countries was lower than that for china and ASEAN.

Secondly, the results of the nine countries' impact scale and reaction speed were shown in Table6.

**Table6. Euro-Zone Economic Impact and Reaction Speed**

CR	Supply Shocks		Demand Shocks		Monetary Shocks	
	Scale	Speed	Scale	Speed	Scale	Speed
Germany	0.011	0.732	0.020	0.860	0.010	0.808
France	0.006	0.653	0.019	0.946	0.002	0.632
Italy	0.006	0.718	0.020	0.958	0.005	0.835
Portugal	0.009	0.721	0.016	0.923	0.013	0.768
Austria	0.008	0.642	0.018	0.853	0.002	0.712
Belgium	0.005	0.696	0.020	0.915	0.004	0.688
Netherlands	0.002	0.678	0.018	0.897	0.004	0.846
Greece	0.011	0.869	0.018	0.967	0.011	0.752
Spain	0.007	0.656	0.022	0.938	0.006	0.822
Average	0.007	0.637	0.017	0.826	0.006	0.686

The results showed that compared with China and ASEAN countries, these countries faced smaller impact scale and slower reaction speed, which indicated that Euro-zone countries' monetary cooperation experienced less resistance but higher implicit cost for maintaining such cooperation.

Basically, the integrated comparison results demonstrated that China-ASEAN monetary cooperation faced higher explicit cost, lower implicit cost, and more cooperation resistance. Since China and ASEAN countries and the Euro-zone countries have their own superiorities, this paper suggests that China and ASEAN countries have basic economic foundation for the single currency union. However, considering the European debt crisis and other negative situations attributed from the over-rapid process of the Euro and the insufficient leading force of RMB, the priority for China and ASEAN countries, at the present stage, is to strengthen the policy coordination and regional economic integration. Subsequently, the transition plan of the single currency union. should be promoted, and such transition could be extended from fifteen to twenty years. Furthermore, in order to play a lead role in the future monetary cooperation, China should take full advantage of the transition-period through promoting industrial upgrading as well as the internationalization process of RMB.

#### Acknowledgement

This paper is the phased result of the researches approved by the National Natural Science Fund of China, which is *The Welfare Effects of the Foreign Exchange Markets for the RMB and the Currencies in ASEAN Based on the Multinational CGE Model* (NO. 71363064).

#### REFERENCES

- [1]X.Y. Cui. The research on the economy feasibility of East Asia optimum currency area. China Financial Publishing House, Beijing, **2010**: 45-69.
- [2]T.J. Cai, J. Sun. *Asia-pacific Economic Review*, **2012**, (6): 73-76.
- [3]S.H. Wen. *Into Economic Issues*, **2007**, (7): 94-99.
- [4]H.Y.P. Ling. *ASEAN Economic Bulletin*, **2001**, 18(2):206-217.
- [5]W.H. Chen. *Journal of Regional Financial Research*, **2012**,(10): 63-69.
- [6]B. Eichengreen. *Exorbitant Privilege*. China Citic Press, Beijing, **2011**:92-126.