2014

ISSN : 0974 - 7435 Volume 10 Issue 10

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(10), 2014 [4401-4406]

Feasibility analysis of Chinese Yuan

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ABSTRACT

The emergence of Euro has opened the doors of the monetary cooperation. As lack of monetary coordination and cooperation mechanism, the process of China-ASEAN monetary cooperation is nearly stagnate. However, building sub-currency area may meet the reality needs of China and ASEAN countries. Based on VAR model, the article used the relevant annual data from 1983 to 2012 of China mainland, Hongkong and Macao to examine economic impact correlation and the reaction speed. By comparing these empirical results of ASEAN countries we make the conclusion that it is more feasible to carry out Chinese yuan..

KEYWORDS

VAR; Chinese yuan; Symmetry of economic impact; Impulse response function.

INTRODUCTION

Economic globalization has had accelerated the process of regional economic integration. 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. However, as lack of necessary monetary coordination, cooperation mechanism and political barrier, it is difficult to fulfil monetary cooperation across the whole China-ASEAN countries. So building sub-currency area may meet the reality needs of China and ASEAN countries and lead to further larger-area monetary cooperation. The paper finally select three regions from China as starting point to analysis the feasibility of Chinese yuan.

LITERATURE REVIEW

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[1].

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].

The asymmetry of economic impact

Eichengreem 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[3].

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[4].

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. So Chinese yuan appears appropriate time[5].

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.

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 Mainland, Hong Kong, Macao these three regions ranging from 1983-2012. The data mainly comes from The World Bank, The Asian Development Bank and International Monetary Fund, etc[6].

Model

We establish 3 ternary n order VAR Model according to the information, the formula is: $C_o S_t = \alpha_1 S_{t-1} + \alpha_2 S_{t-2} + \cdots + \alpha_n S_{t-n} + \varepsilon_t, t = 1,2,3\cdots,T$ 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. $\alpha_1, \alpha_2, \cdots \alpha_n$ is lagged endogenous variable coefficient matrix, ε_t is interference item. If VAR is effective the matrix C_0 must be reversible. To simplify VAR, we set $\beta_i = Co^{-1}\alpha_i$, To sum up we finally get a simplified 3*n order VAR Model:

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

THE FEASIBILITY EMPIRICAL ANALYSIS

Co-integration test

Before the feasibility analysis, co-integration test is firstly applied to observe the stability. Considering the stability of variables, the paper firstly uses ADF test to detectthe stability of these three variables. 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 TABLE 1.

TABLE 1 : ADF Test

Region	Varible	ND	(C, T, K)	ADF Value	DW Value	1%CV	5%CV
China Mainland	Y	2	(0, 0, 1)	-5.29	1.91	-2.67	-1.96
	I	2	(0, 0, 2)	-4.04	1.99	-2.68	-1.96
	R	2	(0, 0, 2)	-4.37	1.99	-2.68	-1.96
Hong kong	Y	2	(0, 0, 1)	-6.5	1.92	-2.66	-1.95
	I	2	(0, 0, 5)	-2.77	1.86	-2.67	-1.96
	R	2	(0, 0, 3)	-4.91	1.94	-2.66	-1.96
Macao	Y	2	(0, 0, 1)	-5.36	1.97	-2.66	-1.95
	I	2	(0, 0, 1)	-8.89	2.08	-2.66	-1.95

	R	2	(0, 0, 2)	-4.39	2.01	-2.66	-1.96

"C, T, K"respectively represent constant term, trends and lag order number. "ND, CV" respectively refers to number of difference and critical value. As all the data has passed ADF test we can move to co-integration test.

In order to prevent the possibility of spurious regression, we take the equation to co-integration test, the result shows that the trace statistic is greater than the 1% critical value. So co-integration relationship exists in the equation.

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 minimum value 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.

Correlation analysis of supply shocks

TABLE 2 : Correlation Analysis of Supply Shocks

Region	China Mainland	Hong Kong	Macao
China Mainland	1		
Hong Kong	0.921	1	
Macao	0.968	0.886	1

As shown in TABLE 2, the correlation degree of supply shocks among three regions was very high, which indicated that these three regions had similar economic growth patterns and economic structures. So these three regions have had basic conditions to carry out a higher level of policy coordination and monetary cooperation.

Correlation analysis of demand shocks

As shown in TABLE 3, compared with supply shocks, the correlation of demand shock was still signnificant but much smaller. It mainly depends on regional industrial structure. So if these three regions suffer from economic shocks, its complementary effect will be greater than the substitution effect.

TABLE 3 : Correlation Analysis of Demand Shocks

Region	China Mainland	Hong Kong	Macao
China Mainland	1		
Hong Kong	0.559	1	
Macao	0.571	0.709	1

Correlation analysis of monetary shocks

As shown in TABLE 4, the correlation degree of monetary shocks is between supply shocks and demand shocks. The correlation between China and HK, Macao is significant, which indicated that these three regions have had the foundation for further monetary cooperation and the cost is smaller than fiscal policy coordination.

TABLE 4 : Correlation Analysis of Monetary Shocks

Region	China Mainland	Hong Kong	Macao

China Mainland	1		
Hong Kong	0.732	1	
Macao	0.724	0.732	1

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 respond speed is fast, the hidden cost of monetary cooperation will be less, and vice versa.

The paper choose annual dollar index to detect impact scale and speed. 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. As the direct outcome can not decide whether Chinese Yuan is feasible, we compare the outcome to ASEAN countries as judgement standard. The outcome was shown in TABLE 5 and 6.

TABLE 5 : China Mainland, Hong Kong and Macao Economic Impact and Reaction Speed

	Supply Shock		Demand Shock		Monetary Shock	
Region	**Scale**	**Speed**	**Scale**	**Speed**	**Scale**	**Speed**
Mainland	0.009	0.685	0.021	0.918	0.013	0.937
Hong Kong	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

TABLE 6 : ASEAN Economic Impact and Reaction Speed

	Supply Shock		Demand Shock		Monetary Shock	
Country	**Scale**	**Speed**	**Scale**	**Speed**	**Scale**	**Speed**
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

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

Basically, the integrated comparison results demonstrated that these three regions faced higher explicit cost, lower implicit cost, and more cooperation resistance. Since China three regions and ASEAN countries have their own superiorities, the paper suggests that China three regions have basic economic foundation for Chinese Yuan.

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