The Significance of Renminbi in East Asian Currencies' Exchange Rate System

東アジア為替システムにおける人民元の有意性

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周学智

ZHOU　XUEZHI

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ZHOU XUEZHI

Abstract

China has made remarkable achievements in economic developments since the reform and opening-up policy lunched. A large economy always means a large economic power in the world as well as in the region. China's economic influence over other East Asian countries has expanded with its fast-growing economy. From a perspective of gravity model of trade, there may be close trade relationships between China and other East Asian countries, because of China's huge economic mass and the short geographic distance. For example, China has already been the hub of the East Asian production chain and most East Asian countries maintain close trade relationships with China. We also find that China is the largest market provider for these East Asian countries (region). In addition, China also has been the most important source of trade surplus for these East Asian countries (region). These economic fundamentals can be thought as the base for a closer exchange rate relationship between the Renminbi (RMB) and East Asian currencies (EACs).

Also, the Chinese authorities have pursued the RMB internationalization and encourage using Renminbi abroad. In recent years, the Chinese authorities have adopted a series measures to do this. In fact, the Chinese authorities have pushed the Cross-Border Trade RMB Settlement Pilot Project to allow companies import and export in RMB with neighboring countries including ASEAN countries. Also, the Chinese authorities have signed a series of currency swap agreements with foreign center banks. Under the agreements, the foreign banks can sell the RMB to the

enterprises who can directly use the RMB in the international trade. In addition, the swaps can also provide Renminbi liquid abroad. The Renminbi's internationalization is also promoted by establishing RMB off-shore centers in Hong Kong, Singapore and London. As a result, the Renminbi became the fourth most used payments currency in the world in August 2015 according to the Society for Worldwide Interbank Financial Telecommunication (SWIFT). The Renminbi´s participation in foreign exchange markets also increased obviously according to the Bank for International Settlements (BIS).

Meanwhile, the RMB exchange rate system has also been reformed by the People's bank of China (PBC). Since the mid-1990s, the Chinese authorities had carried out a series of measures trying to reform the RMB exchange rate system. Since July 21, 2005, the Chinese authorities have done lots of efforts to push the RMB exchange rate system towards "market-oriented". A major content of these reforms is widening the fluctuation band of the Renminbi exchange rate and almost all of the RMB exchange rate system reforms are related to the fluctuation band of RMB exchange rate against the US dollar. The *de jure* daily fluctuation band of USD/RMB is expanded from almost 0% before July 21, 2005 to 2% after March 17, 2014. Also, during the period from 2010 to 2016, the USD/RMB rate experienced both appreciation and depreciation trend.

The RMB is becoming more and more important in the international monetary system. On October 1, 2016, the RMB joined the International Monetary Fund's (IMF) Special Drawing Rights (SDR) basket, which is thought as recognition of Renminbi internationalization and exchange rate system reforms.

In East Asia, the exchange rate system has been studied since 1990s. When we think one currency's exchange rate system, we should consider how this currency fluctuates against other currencies, such as the fluctuation band, its anchor currency and currency basket, and the intervention. These sides can be reflected in the exchange rate relationships. The East Asian countries have some common economic properties such as "export-oriented". In this case, the East Asian currencies also have some commonalities, for example, most of them kept relatively close relationships

with the USD. Keeping their currencies stabilization against the USD can help the East Asian countries achieve economic growth and reduce external risks. In other words, the USD is very important in East Asia, both for the East Asian monetary authorities and foreign exchange market participants. However, according some studies, the USD's position has been changed in recent years, and the East Asian currencies show various characteristic in recent years.

According to Kenen (1983), an international currency always has three functions, which are "medium of exchange", "unit of account" and "store of value". We mainly detect the relationship between the RMB and East Asian currencies from a perspective of exchange rate in this study. China has been a significant role in economic field in East Asia and there is a very close trade relationship between China and East Asian countries. Meanwhile, the more international Renminbi and its more flexible exchange rate may be positive factors for Renminbi exchange rate playing a significant role in East Asia. In this study, we will check whether or not the RMB plays a significant role in the field of exchange rate in East Asia, as well as the evolution. Because of the small margin of the return of USD/RMB, the interaction between the RMB and East Asian currencies are neglected for a long time. However, when the fluctuation band of the rate of USD/RMB became larger in recent years, it is unavoidable to reconsider the relationship between the RMB and East Asian currencies, as well as the importance of China's currency: Renminbi's role in East Asian foreign exchange market.

Comparing with the previous studies, there are some contributions in this study. Firstly, the traditional studies mainly focus on the currency baskets when they study the exchange rate relationships between the RMB and East Asian currencies. In this study, we research the issue from many perspectives, which are shocks, volatilities and correlations. The methods employed in this study can avoid the shortages exist in the currency basket regression model. In addition, these methods can provide supports or paradoxes to each other. Secondly, the existing studies are mainly "whole sample period" model. However, this method is not appreciable as the fast change of the RMB exchange rate system. In this study, we analyze the issue periodically, even

dynamically. The periodical and dynamic methods can obtain more detail and accurate results. Thirdly, we analyze the correlation of the RMB and East Asian currencies when the RMB was on appreciation and depreciation trends, separately. This is a new perspective of studying the RMB's role in East Asia. From an economic perspective, there are differences between a weak RMB and strong RMB for some East Asian countries, as well as their currencies. Through this method, we connect the economic factors and currency market to some extent.

The main contents are following.

Firstly, we study whether or not the Renminbi exchange rate shocks can influence East Asian currencies' exchange rate. If so, how about the evolution with the expanding Renminbi exchange rate fluctuation band. To do this, Vector Autoregressive (VAR) models are employed in this study. The sample East Asian currencies are South Korean Won (KRW), Malaysian Ringgit (MYR), Singapore Dollar (SGD), New Taiwan Dollar (TWD) and Thai Baht (THB). Because of the important position of the US dollar in East Asia, we choose the New Zealand dollar (rather than the USD, Special Drawing Rights (SDR) or Swiss Franc (CHF)) as the numeraire currency. By doing this we can put the US dollar and Renminbi, as well as the Euro into one model simultaneously. Although the daily fluctuation band of the rate of USD/RMB increased during the whole sample period, the relatively small band may still cause the multicollinearity problem. To remove the "US dollar factor" from the RMB exchange rate, we use the residuals obtained by ordinary least squares regression (OLS) as the proxy of the RMB exchange rate. As the promotion of the RMB exchange rate system, the daily fluctuation of the RMB became larger. Thus, we choose the days on which the People's bank of China launched the RMB exchange rate system reforms and widened the fluctuation band as the break points. The sample period is from June 21, 2010 to December 30, 2016, and it is divided into three sub-periods.

Secondly, the expanding RMB fluctuation band and the promotion of RMB internationalization also mean a larger risk not only for itself, but also for other currencies, for example, the East Asian currencies. In this part, we employ the BEKK

(Baba-Engle-Kraft-Kroner) GARCH model to detect whether or not the RMB exchange rate shocks and volatilities can affect the East Asian currencies' exchange rate volatilities. In other words, whether or not there are spillover effects between the RMB and East Asian currencies, further, how about the directions. Through the exchange rate spillover effects, we can judge the RMB's role in East Asia. Since the step of the RMB internationalization and the promotion of exchange rate system reform are fast from 2010 to 2016, it is not suitable to detect the spillover effects during the whole period. In this part, we divide the whole sample period into three sub-periods, each one contains two years. By doing this, we can judge the significance of the RMB exchange rate's role from a perspective of spillover effects in each sub-period, as well as its evolution.

Thirdly, after detecting the shock and spillover effects between the RMB and East Asian currencies, we focus on detecting the exchange rate return correlations among some important international currencies (such as US dollar, Euro and Japanese Yen), the RMB and East Asian currencies during the whole sample period from June 2010 to September 2016. To do this, we employ the DCC-GARCH (Dynamic Conditional Correlation Generalized Autoregressive Conditional Heteroskedasticity) model which can detect the conditional correlations between these sample currencies' returns. Comparing with the CCC-GARCH model, the DCC-GARCH has many merits. For example, the conditional correlations are dynamic and we can compare the average values of DCC in one model rather than divide the sample period into some sub-periods and employ more than one model. The exchange rate return reveals the degree of stability of one currency to its numeraire currency. Then, a higher DCC means a closer exchange rate relationship between two currencies. In other words, the DCC(s) can reveal whether the two currencies move together against their numeraire currency, if so, to what extent. Unlike dividing the whole sample period into some sub-periods, the DCC-GARCH model can obtain the dynamic and continuous correlations among these sample currencies. From June 2010 to September 2016, the rate of USD/RMB experienced both appreciation trends and depreciation trends. When there is a close economic relationship between China and East Asian countries,

for example, China has been the most important source of trade surplus for most East Asian countries, the exchange rate relationship between the RMB and East Asian currencies may be different when the RMB exchange rate was on the appreciation and depreciation trends. We choose the day on which the exchange rate of USD/RMB got its lowest point at 6.04 to detect whether or not the correlations between the RMB and East Asian currencies show different characteristics when the RMB was on different trends. In more detail, whether or not the exchange rate return conditional correlation between the RMB and East Asian currencies was strengthened when the RMB became more flexible and shifted into a depreciation trend after January 14, 2014.

We obtain some findings following.

Firstly, we find that the RMB exchange rate shocks could more and more significantly affect some East Asian currencies exchange rate with the expanding of the RMB exchange rate fluctuation band from 2010 to 2016. During the first sub-period when the daily fluctuation band of the USD/RMB was limited within 0.5%, the RMB exchange rate shocks could not affect East Asian currencies exchange rate at all. From the results obtained by the VAR models, none of the accumulated responses of East Asian currencies to the RMB exchange rate shocks are significant as we cannot reject that the responses equal 0 within 95% confidence interval. This means that the RMB's role was not significant during the first sub-period. When the daily RMB exchange rate fluctuation band was expanded to 1%, the East Asian currencies responded to the RMB exchange rate shocks significantly to a certain extent, however, the impacts were still small that the RMB was still not significant currency in East Asia. However, when the RMB daily fluctuation band was expanded to 2% during the sub-period A3, the more flexible RMB could significantly affect all of the sample East Asian currency exchange rates movements, except for the THB. This means that the flexible RMB played a significant role in East Asia when it deviates from the US dollar. Meanwhile, the US dollar was always the dominant currency since all of the East Asian currency exchange rates movements were significantly influenced by the US dollar exchange rate shocks. The EUR was another important currency in East Asia, particularly during the period from June, 2010 to March, 2014. However, its

role was not significant during the sub-period A3.

Secondly, the RMB exchange rate could also transfer more and more exchange rate risks to other currencies. When we break up the whole sample period, we find that the spillover effects transferred from the RMB to some East Asian currencies became more and more significant during the period from 2010 to 2016. This progress also developed gradually. During the first sub-period, almost all of the parameters in the BEKK-GARCH model which represent the exchange spillover effects were not significant, except for the TWD. These results show that there were almost no exchange rate spillover effects from the RMB to East Asian currencies, and the RMB played an insignificant role in the field of exchange rate risks in East Asia. However, during the second and third sub-periods, especially the third period, the RMB could significantly transfer exchange rate spillover effects to East Asian currencies. Among these currencies, the THB is the only currency whose volatility is immune to the RMB exchange rate return shocks and volatilities, this also means that the relatively loose relationship between these two currencies. In this part, we also detect the exchange rate spillover effects between the US dollar and East Asian currencies by choosing the New Zealand dollar as the numeraire currency. From the results, the USD can transfer not only return shock but also volatility spillover effects to these sample East Asian currencies' volatilities during the period from 2010 to 2016, except for the KRW. This demonstrates the very important role of the US dollar in East Asia.

Thirdly, through the DCC-GARCH model, we found that the US dollar was always a dominant currency for East Asian currencies comparing with the Euro and Japanese Yen when we choose New Zealand dollar as the numeraire currency, although the exchange rate return co-movements between the US dollar and East Asian currencies became weaker during the sample period. Meanwhile, the RMB was still subdued because of it stood too near to the US dollar while other East Asian currencies showed greater flexibility against the US dollar. This also suggests that the exchange rates of these East Asian currencies became more flexible, while the RMB's exchange rate flexibility has increased slowly, comparing with other East Asian currencies. However, when we choose the USD as the numeraire currency, the exchange rate return

co-movements between the RMB and some of the EACs showed a rise during the period in which the RMB exchange rate run into a depreciation trend against the US dollar. These results confirm the existence of the "fear of appreciation and fluctuation" against the RMB in SGD, KRW and TWD. We also find that these three countries (region) kept large trade surplus with China, while China was not Malaysia and Thailand's most important source of trade surplus. It seems that the results are quite mixture even contradictory when we employ the NZD and USD as the numeraire currency respectively. In fact, this just reveals the RMB's increasing but limited role in East Asia. The RMB is neither a polar of East Asian exchange rate system nor a challenger to the USD. If the RMB exchange rate system can be reformed further in the future, the RMB may potentially attract more attention in East Asia.