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The study of exchange rate variability and pressures for Asian currency unit

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ABSTRACT

This study considers the early warning system and adopts the fixed and random effects models to analyze both the exchange rate variability and pressures of the Asian currency unit (ACU) between March 2, 1992 and December 30, 2008. Results revealed that exchange rate variability has a significant relationship with the estimated ratio of M2 to foreign reserves, banking sector fragility, and foreign reserves growth rate. In the regression of exchange rate pressure, the ratio of balance on current account to gross domestic product and the industrial production index growth rate has been proven to exhibit a significant relationship. Regarding the ACU framework, this study revealed that stabilization of banks, international trade, and money supplies are the main factors to prevent financial crises. Therefore, this study provides a reference to integrate Asian countries into an economic alliance and establish an international trade system.

1. Introduction

The objectives of having a currency unit include circumventing financial crises by maintaining the exchange rate target zone, sustaining economic growth, and controlling inflation. However, despite the numerous benefits of building a currency unit, achieving such objective is still difficult because of the requirements of central banks for currency unit members to relinquish their monetary policy powers. Halpern and Wyplosz (2001) and Rogers (2001) confirmed that the benefit of building an optimum currency area (OCA) reduced the transaction costs and uncertainty of economic policies among European countries. Bayoumi and Eichengreen (1998) explained that countries with considerably variable exchange rates are subject to substantially large asymmetric shocks because of their small size and trade dependence. Horvath (2005) and Bangake (2008) extended the core of OCA theory to 20 developed countries in the 1990s, as well as to African countries between 1990 and 2003, to provide different financial policies, thereby avoiding asymmetric shocks.

Tracking the development of the Euro has revealed that exchange rate is a vital component of a currency unit and plays a crucial role in early warning systems (EWS) in terms of predicting financial crises. This component significantly stabilized the European Union's (EU) currency and improved the ability of EU to prevent financial crises. The EWS approach designed by Kaminsky, Lizondo, and Reinhart (1998) (hereafter referred to as the KLR model) involved monitoring the evolution of 15 economic indicators that tended to systematically behave abnormally prior to a crisis. Kaminsky and Reinhart (1999) and Goldstein, Kaminsky, and Reinhart (2000) also developed EWS to analyze the twin crises resulting from the Mexican and Asian financial turmoil. Furthermore, Edison (2000) extended the KLR model and created the exchange market pressure index. The results revealed that the empirical coefficients of reserves, exports, real exchange rate, ratio of M2 to reserves, and imports have been at least one signal prior to at least one crisis. By modifying the KLR model, Bussiere and Fratzscher (2006) attempted to avoid post-crisis bias, thereby improving the ability to predict a financial crisis. Fuertes and Elean (2007) assessed the optimal design of EWS based on sovereign debt crises. However, Berg and Catherine (1999b) argued that the KLR model issued more false alarms than accurate warnings, thereby failing to predict most crises.

Although several studies on the Asian financial crisis were conducted, only a few analyzed the relationship between the Asian currency unit (ACU) and the financial crises. Chen and Hisao (2006) used the ordered probit and ordered logit models to explore the relationship between the threshold values of ACU's central exchange rate and the currency crises. The progressive increase in systematic

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risks tied with the national linkage encouraged many countries to exert effort to reduce economic loss and prevent crises by implementing EWS. Lee (2007) used the bivariate and simultaneous equation probit models to analyze the relationship between the twin crises, which were measured by two pressure indices and a banking fragility index, and macroeconomic variables. The empirical results showed that the currency crisis was highly likely to have significantly positive effect on the occurrence of a banking crisis. Both stock index and inflation rate played crucial roles in affecting both crises. The results also revealed that bank deposits and the industrial production index were highly likely to have influenced the twin crises. Jau (2008) reported that the Chiang Mai Initiative and the ACU issue were the concerns in Asia during the financial crisis, which resulted in serious damage to regional economies. To analyze the causes of the contagion effect, Chen and Fang (2008) verified the contagion causes using the ACU structure. By adopting the adaptive network-based fuzzy inference system, the empirical result proved that the contagion effect would most likely be influenced by tight financial linkage and macroeconomic conditions.

Utilizing exchange rate variability and pressure related to the currency unit has yet to be explored as a research area. The cooperation of exchange rate stabilization will be a vital factor to realize an economic convergence region. This study uses the fixed and random effects models, is based on panel data, and adopts three types of variables (i.e., banking, monetary, and macroeconomic factors) to explore the effects of the key elements on exchange rate variability and pressure in ACU. This study will also provide valuable and reliable recommendations to integrate various economic policies.

2. Data

The calculation of ACU refers to the basket framework of the European currency unit constructed from net foreign reserves, exports, and gross national product per capita. Given the recent circumstances of severe political disputes and economic turmoil in Asia rather than in Europe, the time interval of realigning the ACU exchange rate necessitates a reduction from a five-year to a three-year period to apply the exchange rate mechanism close to the variations of Asia's economies.

Bayoumi and Eichengreen (1998) and Horvath (2005) investigated the exchange rate variability level and pressure as dependent variables. The data used in this study were collected from the International Financial Statistics, Taiwan Economic Journal, and Advanced Retrieval Econometric Modeling System. The Maastricht Treaty framework and the Preferential Tariff Agreement during the fourth Association of South East Asian Nations conference in January 1992 provided the database period from March 2, 1992 to December 30, 2008 for the quarterly data.

The bilateral exchange rate variability is

$$VOL_{ij} = SD\lfloor \Delta(\log(e_{ij})) \rfloor, \tag{3}$$

where e_{ij} presents the nominal exchange rate or central rate of ACU between countries i and j.

The estimation of exchange rate pressure is the dependent variable that adjusts the exchange rate variability for the influence of intervention. Bayoumi and Eichengreen (1998) and Horvath (2005) constructed a model to measure the degree of change of reserves to narrow money (i.e., the neutralized incipient exchange rate movements).

$$Intervention_i = \frac{\Delta(\mathrm{Re}\, s_i)}{Narrow_i} \times (-1), \tag{4}$$

where $\Delta(Re\, s_i)$ is the quarterly change of reserves in country i and $Narrow_i$ is a measure of narrow money. Based on the bilateral exchange rate variability, we build the exchange rate pressure formula for the ACU exchange rate, changes of intervention, and interest rate differential in every estimated country.

$$\mathrm{Pressure}_{ij} = SD\lfloor \alpha\Delta(\log(e_{ij})) + \beta\Delta Intervention_{ij} + \chi\Delta r_{ij} \rfloor, \tag{5}$$

where $\Delta(log(e_{ij}))$ is the change in logarithm of the nominal exchange rate between countries i and j, $\Delta Intervention_{ij}$ is the change of *Intervention* between countries i and j, and Δr_{ij} indicates the difference between the short-term interest rates in countries i and j.

The present study attempts to probe the variables influencing the bilateral central exchange rate variability and exchange rate pressures in ACU (that includes Japan, Taiwan, Hong Kong,

$$\text{The unit of each country's current basket is (ACU)} = \left(\frac{\text{Each Country's Export Volume}}{\text{Sum of Total Trade Amount}} + \frac{\text{Each Country's net Reserves}}{\text{Sum of Total Foreign Reserves}} + \frac{\text{Each Country's GNP per Capital}}{\text{Sum of GNP per Capita}}\right) \times \text{The Exchange Rate against U S Dollars} \times \text{Special Drawing Rights(SDR)} \tag{1}$$

The current study followed the ACU formula of Yang (2008) to adopt an adjusted exchange rate defined as:

$$\text{Adjusted ACU} = \left(\frac{\text{Each Country's Export Volume}}{\text{Sum of Total Trade Amount}} + \frac{\text{Each Country's net Reserves}}{\text{Sum of Total Foreign Reserves}} + \frac{\text{Each Country's GNP per Capital}}{\text{Sum of GNP per Capita}}\right) \times \text{Adjusted Exchange Rate} \times \text{ACU against US Dollar one Day before Base Period.} \tag{2}$$

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