Real exchange rate behavior and optimum currency area in East Asia: Evidence from Generalized Purchasing Power Parity

Ritesh Kumar Mishra [a,*], Chandan Sharma [b]

[a] Department of Financial Studies, University of Delhi, India and Institute of Economic Growth (IEG), New Delhi, India
[b] Economics and Business Policy, FORE School of Management, New Delhi-110016, India

ARTICLE INFO

ABSTRACT

In the aftermath of the Asian financial crisis, the need for monetary and exchange rate cooperation among the Asian countries has increased considerably. In this context, we attempt to evaluate the potential of an optimum currency area (OCA) for a group of eight East Asian countries. For this purpose, this study tests Purchasing Power Parity (PPP) and Generalized PPP (GPPP) hypothesis, which provides stylized facts of real exchange rate. Specifically, we attempt to investigate the symmetry in macroeconomic disturbances and the co-movements of bilateral real exchange rates of the East Asian countries as one of the standard minimum precondition for forming an OCA. Contrary to many previous studies, we find some supportive evidence for GPPP which, in turn, provides support for the feasibility of an optimum currency area in East Asia. However, the presence of asymmetries in the process, through which countries adjust to shocks in the system, indicates that still higher level of economic integration is required to strengthen the case of a currency union. More importantly, our overall results appear to be invariant to the choice of a base currency and therefore it provides support to the argument that both US dollar and Japanese Yen are important for East Asia while considering the case of a currency union.

© 2010 Elsevier Inc. All rights reserved.

1. Introduction

The debate on economic prospect for enhanced exchange rate cooperation, economic convergence and the potential of an optimum currency area (OCA) in the East Asian region has intensified in the aftermath of the Asian financial crisis of 1997–1998. Before the Asian currency crisis the economic performance of East Asia was miraculous but the currency crisis surprisingly injected frailty into the impressive success story of the East Asian countries. Though it is widely recognized that the Asian financial crisis has increased the economic inequality in the region, but fortunately, it has also regenerated a new wave of political and economic interest for a greater cooperation in managing exchange rate and monetary issues. In some sense, the Asian financial crisis has exposed vulnerabilities of the exchange rate regime in the region and the difficulty of a small open economy in managing exchange rate unilaterally, when the economy is experiencing massive in and out of foreign capital (Wilson and Choy, 2007). During the pre-crisis period East Asia was roughly known to be a soft dollar zone under which currencies were loosely pegged to US dollar (Frankel, 1993; Frankel and Wei, 1994). And now it is recog-

nized that this *de facto* peg was one of the major causes of the financial crisis. Consequently some recent studies have emphasized the need for an alternative exchange rate arrangement to enhance exchange rate stability in East Asia. In this concern, some highly discussed alternatives include, for example, the formation of a Common Currency Area (Eichengreen, 1994), the formation of a yen block in East Asia (Kwan, 1998), common basket peg (Williamson, 1999), restoration of dollar based exchange rate regime with a well regulated banking system (McKinnon, 2000), and basket peg to keep real effective exchange rate stable (Ogawa and Ito, 2002).[1] Among these alternatives, policy makers in the region have expressed profound interest in the proposal of a common currency area for East Asia. Owing to some recent new initiatives in the areas of free trade the degree of economic and financial integration among these countries has witnessed considerable improvement in the post-crisis period. As a result, the possibilities of greater monetary and exchange rate cooperation to form a currency union now seems to be rather realistic event in the future.

In the present study, we attempt to provide some further evidence on the feasibility of forming a currency union in East Asia by examining the behavior of bilateral real exchange rates using the concept of

---

* Corresponding author. Department of Financial Studies, University of Delhi, South Campus, Benito Juarez Road, New Delhi-110021 India. Tel.: +91 11 24118854.
E-mail addresses: ritesh.mishrakr@gmail.com (R.K. Mishra),
chandanieg@gmail.com (C. Sharma).

[1] See Eichengreen (1994), Bayoumi and Eichengreen (1994), Eichengreen and Bayoumi, 1999), Kwan (1998), Fabella (2002), Mundell (2003), and Shirono (2007) for a detailed discussion on the various aspects of the optimum currency area in East Asia.

Purchasing Power Parity (PPP) and Generalized PPP (GPPP).[2] Specifically, we have twin objectives in this paper. First, we attempt to test the mean reversion behavior of real exchange rates by testing the validity of PPP hypothesis for a group of eight East Asian countries. It was argued that the concept of PPP is not explaining the movements in exchange rates and prices satisfactorily in the post World War II period and the non-stationarity of real exchange rate was largely due to the non-stationarity of the fundamental determinants of real exchange rates (see Sarno, 1997). To address this issue Enders and Hurn (1994) developed the theory of GPPP as an alternative way to study the real exchange rate behavior. According to the GPPP theory, individually non-stationary bilateral real exchange rates may be cointegrated, if their long-run macroeconomic determinants or 'forcing variables' are highly associated. Our second aim in this paper is to test the empirical validity of GPPP introduced by Enders and Hurn (1994). In doing so, we attempt to assess the potential of any favorable macroeconomic condition for an optimum currency area (OCA) among East Asian countries.[3] GPPP offers an effective way to examine the possibility of an OCA in the sense defined by Mundell (1961) that real output levels and probably expenditure pattern will share a common trend in an OCA. The GPPP theory is based on the basic idea that real exchange rates of a group of countries may be individually non-stationary, but if the fundamental macroeconomic factors that drive exchange rate are sufficiently integrated across countries, a liner combination of these non-stationary real exchange rates will be stationary and they will share common trends in the long-run. Further, the theory of GPPP also suggests that if the economic integration among a group of countries is high, the bilateral real exchange rate of a country is influenced by the exchange rates and the fundamentals of other countries present in the group (see Sideris, 2009).

Many recent studies have employed the OCA criterion to evaluate the prospect of currency union in East Asia, but the overall results are rather mixed so far. For example, considering the OCA criterion Eichengreen and Bayoumi (1999) argue that East Asian countries are as likely candidates for a currency union as the countries of European Union. Whereas, Chow and Kim (2003) find that a common currency area may be a costly alternative and difficult to sustain in East Asia since these countries face asymmetric shocks. Similarly, Hoffmaister and Roldos (1997) also find that output fluctuations in East Asia are mainly driven by local supply shocks that makes fixed exchange rate arrangement less attractive. However, using a micro-founded gravity model Shirono (2007) show that a regional currency arrangement in East Asia will increase the regional trade considerably and will result in economically significant welfare gains. Therefore, it is both interesting and relevant to take on further investigation to assess the potential of an OCA in East Asia.

Against this background, this study is set to examine the viability of a common currency area in a case of eight East Asian countries under the GPPP framework. This study contributes to the related literature in several ways. First, the concept of PPP has an important implication for East Asia, because the validity of PPP against a base currency (US dollar or Japanese Yen) will help to figure out the best contender of a common currency in the region. Further, the degree of conformity to PPP can be considered as a helpful measure for evaluating the relation between the possible candidates of common

currency and the potential members of the OCA in East Asia (see Kim et al., 2009). Second, in this study we consider two different base currencies, viz., US dollar and Japanese Yen (JPY, hereafter), to test the empirical validity of PPP and GPPP hypothesis. Inclusion of two different base currencies allows us to verify if the results are sensitive to the distance and choice of base currency. Third, the test of GPPP hypothesis (Enders and Hurn, 1994) for our sample countries will help to assess the feasibility of an OCA in the region. Four, along with Pedroni (2004) panel cointegartion test we also apply the combined Fisher–Johansen test to confirm the results. One of the major advantages of the combined Fisher–Johansen test is that unlike the residual based Pedroni's test it can detect the presence of more than one cointegrating relationships in the system.

Rest of the paper is organized as follows. Section 2 contains a brief description of the concept of PPP and GPPP and presents their empirical implications for OCA. Section 3 presents the review of literature whereas Section 4 discusses the empirical methodologies. Section 5 presents data description and empirical results and finally Section 6 provides summary and main conclusions.

2. PPP, GPPP and OCA: theory and model

2.1. Purchasing Power Parity

During the 1990s an increasing number of Asian countries have adopted market oriented economic policies. In a very short span of time their booming economies have emerged as high return investment destination for foreign investors. However, the massive in and out of foreign capital has led to excess volatility of the exchange rate imposing a serious challenge for macroeconomic stability of these countries. Consequently, the efficient management of capital account and exchange rate has become a crucial policy issue for central banks of these countries. Further, economic instability and big currency crisis like the one East Asian crisis (1997–1998) generally create an environment of risk and uncertainty for foreign investors. Investment decisions targeting longer horizons require long-term forecasting of currencies (Salehizadeh and Taylor, 1999). In this context, the theory of Purchasing Power Parity (PPP) is frequently utilized to represent long-term equilibrium condition for exchange rate and to devise correct policy response to arrest the seasonal fluctuations in exchange rate. Purchasing Power Parity is a theory of exchange rate determination which asserts that the nominal exchange rate between two countries should be equal to the ratio of aggregate price levels between related countries. This version of PPP is known as the absolute version of Purchasing Power Parity (APPP). Symbolically:

$$S_t = \frac{P_t}{P_t^*} \tag{1}$$

where S_t is the nominal exchange rate (expressed as domestic price of foreign currency), P_t and P_t^* are the domestic and foreign price levels respectively. Given the nature of the available data, it is quite difficult to measure the absolute PPP and hence we mainly focus on Relative PPP (RPPP). The concept of RPPP says that the percentage change in the exchange rate between two period, say for example t and $t+T$ is equal to the ratio of two related price indices (of domestic and foreign country).[4] The empirical validity of PPP is usually tested by examining the stationarity of real exchange rate through unit root test. The bilateral real exchange rate q_t is calculated as follows:

$$q_t = s_t + p_t^* - p_t \tag{2}$$

where p_t^* is the logarithm of the price index of the country chosen as base country. PPP hypothesis assumes that long-run equilibrium

---

[2] Unless otherwise stated, East Asia represents Indonesia, Malaysia, the Philippines, Singapore, Thailand, Korea, India and Sri Lanka in this paper. It is also noteworthy that Indian and Sri Lankan economy was not largely and directly affected by the Asian financial crisis.

[3] In this study we include India as a potential member of OCA with other seven East Asian countries. Other countries are basically members of Association of Southeast Asian Nations (ASEAN). The members of ASEAN countries are also trying to expand the grouping with Japan, Korea and China (ASEAN + 3) on the east and India on the west. In the recent past, trading relation of India with these countries has witnessed substantial improvement and Indian policy makers have shown interest to become part of ASEAN. On this account we consider India as a potential member of OCA along with these countries in the region.

[4] See Salehizadeh and Taylor (1999) for a detailed discussion.