Do real interest rates converge across East Asian countries based on China?

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A B S T R A C T

This study applies the sequential panel selection method (SPSM), proposed by Chortareas and Kapetanios (2009), to assess the non-stationary properties of the real interest rates relative to China for ten East Asian countries. SPSM can classify the whole panel into a group of stationary series and a group of non-stationary series. We clearly identify how many and which series in the panel are stationary processes and provide robust evidence to indicate that RIRP holds true for five countries. It implies that the choices and effectiveness of the monetary and fiscal policies in the East Asian economies will be highly influenced by external factors originating from China. Also, our findings point out that real interest rate convergence relative to China is mean reverting toward RIRP equilibrium values in a non-linear way.

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1. Introduction

In an open economy, real interest rate parity (RIRP) provides an indication of whether countries are economically and financially integrated or autonomous. The RIRP indicates that the real interest rates of different countries should be identical, provided that markets are frictionless and economic agents' expectations are rational. When RIRP holds, it implies that assets with identical risk, liquidity and maturity have the same expected return across different countries. The RIRP states that, if agents make their forecasts using rational expectations and arbitrage forces are free to act in the goods and assets markets, then real interest rates between countries will equalize (Peel and Venetis, 2005). Meanwhile, the extent of product market integration might provide useful information for countries seeking to join a monetary union. Importantly, verification of real interest rate equalization across countries implies evidence of capital mobility and financial integration. Another important implication is the loss of independence in the individual monetary authorities in controlling the internal real interest rates. If RIRP holds, that means one individual country could not pursue an independent monetary policy, thus, the country may lose the power to influence the real economy. In an open and effective financial market, the interest rate differentials between two countries may cause international capital flows, which may further induce the change of exchange rate. The arbitrage space will decrease due to the change of exchange rate, until

the financial market returns to the equilibrium status (Merlevede et al., 2003; Obstfeld and Rogoff, 1995).

In the early 1990s, massive capital flew into East Asian countries after their economic liberalization and financial deregulation. Accordingly, some countries adopted capital controls to maintain the stability of exchange rate, such as China, Malaysia and Thailand. These countries set restrictions and controls on the international financial transaction to steer inflows and outflows, in which case the interest rate can be set domestically. However, as time passes by, the capital controls have become less effective over time (Eichengreen, 2004). According to the theory of impossible trinity proposed by Krugman (1999), an economy could not maintain perfect capital flows, independent domestic monetary policy and fixed exchange rate system simultaneously. In China, the government has always been faced with the pressure of revaluating RMB and maintaining the stability of the RMB exchange rate since joining the World Trade Organization (WTO) in 2001. As mentioned above, when an economy is integrated with other economies and expanded in foreign trade, capital controls will become much more difficult (Fukao, 1990). Some studies have found that, in recent years, the effectiveness of China's capital control has, over time, diminished and the restrictive system has become difficult to sustain, especially given the fact that current account convertibility, while bringing about massive efficiency gains, has also created numerous leakage and loopholes for illicit capital flows (Ma and McCauley, 2007; Wang, 2009; Yu, 2008). The economic and social costs associated with continued draconian controls over capital movement have become ever larger and better recognized. In addition to imposing heavy administrative burden for the government, capital controls have caused distortion in investing decisions by Chinese enterprisers and households. Furthermore, with the freedom in current account, illegal capital movements especially hot money, may also lead the capital

control to be ineffective. Meanwhile, sterilization operation is another issue of China's government to maintain the independence of monetary policy. A mainstream view argues that although China has sterilized most of its increased reserves, continuing to do so is becoming increasingly difficult (Glick and Hutchison, 2009; Ouyang et al., 2007; Prasad and Wei, 2005), and costs of the sterilizations grow rapidly, such as fiscal cost, financial repression and foreign exchange risk (Aizenman and Glick, 2008; Greenwood, 2008), as its reserves continue to rise and capital controls become more ineffective. Therefore, Chinese authority can't maintain monetary independence and stability of domestic currency through capital transaction restrictions and massive sterilizations with large and persistent capital inflows and skyrocketing foreign reserves (Wang, 2010). Therefore, East Asian countries which possess similar characteristics after undergoing various stages of financial liberalization provide a good platform for the study of financial integration (Baharumshah et al., 2005) and RIRP hypothesis test. First, East Asia is becoming more and more important in the global economy, especially China,[1] but the financial linkages among its numbers have yet to be systematically investigated. The rising of China's economy in the recent decades and the rigorous liberalization of the Chinese financial system following the entrance of China into the WTO in 2001 have attracted researchers to examine the regional financial integration with respect to China. Furthermore, China has yet to further liberalize its financial system and it will overtake Japan as the leading financial center or anchor country for common currency area in this region. Second, the emerging market economies of East Asian countries have removed their regulatory measures at different stages of their economic development. Despite these developments and the increasing importance of China in the world economy, very few studies have looked into China's connection with other countries. Third, and most important of all, the initial conditions for East Asian countries' transition varied extensively and they may be an important indicator in explaining the magnitude of deviations from RIRP.

As for methodology, most studies of RIRP use conventional unit root tests, such as the augmented Dicky and Fuller (1981, ADF) test and the Phillips and Perron (1988, PP) test — but fail to reject the unit root hypothesis. The linear unit root test assumes that in spite of the deviation, the process of real interest rate moving to the equilibrium is linear and the velocity of adjustment is a constant. One feasible way to increase power when testing for a unit root is, of course, to use panel data. Taylor and Sarno (1998), Breuer et al. (2001), Taylor (2003) and Taylor and Taylor (2004) showed that the recent methodological refinements of the Levin et al. (2002) test fail to fully address the 'all-or-nothing' nature of the test. Because they are joint tests of the null hypothesis, they are not informative with regard to the number of series that are stationary processes when the null hypothesis is rejected. Breuer et al. (2001) further claimed that, by analogy to simple regression, when an *F*-statistic rejects the null that a vector of coefficients is equal to zero, it does not follow that each coefficient is nonzero. Similarly, when the unit-root null hypothesis is rejected, it may be erroneous to conclude that all series in the panel are stationary. Furthermore, in the data generating process (DGP), if the nonlinear factors were neglected, we cannot receive the expected results via RIRP. The linear model critically underestimates the velocity of adjustment of long-term equilibrium, and usually we accept the null hypothesis because of the low power of traditional unit root test. The omission of some structural breaks is a possible cause of the traditional unit root tests failing to reject the null hypothesis for stationarity. Perron (1989) argued that if there is a structural break, the power to reject a unit root decreases when the stationary alternative is true and the structural break is ignored. Meanwhile, structural changes presented in the DGP, but neglected, sway the analysis toward accepting the null hypothesis of a unit root. As we know, interest rates might be affected by internal and external shocks generated by structural changes,

which may be subject to considerable short-run variation. It is important to know whether or not the real interest rate has any tendency toward a long-run equilibrium level, because the RIRP hypothesis requires that real interest rate revolves around a constant or a time trend. If the real interest rate is found stationary by using the unit root test with structural break(s), as a result the effects of shocks such as real and monetary shocks that cause deviations from a mean value or deterministic trend to be only temporary. Cuestas and Harrison (2010) provide evidence showing that the existence of structure changes in the RIRP might imply broken deterministic time trends and the result supports the RIRP.

As discussed, traditional unit root tests lose power if structural breaks are ignored in unit root testing. The general method to account for breaks is to approximate those using dummy variables. However, this approach has several undesirable consequences. First, one has to know the exact number and location of the breaks. These are not usually known and therefore need to be estimated. This in turn introduces an undesirable pre-selection bias (see Maddala and Kim, 1999). Second, current available tests account only for one to two breaks. Third, the use of dummies suggests sharp and sudden changes in the trend or level. However, for low frequency data, it is more likely that structural changes take the form of large swings which cannot be captured well using only dummies. Breaks should therefore be approximated as smooth and gradual processes (see Leybourne et al., 1998). These arguments motivate the use of a recently developed set of unit root and stationarity tests that avoid this problem. Becker et al. (2006), Enders and Lee (2012), and Christopoulos and León-Ledesma (2010) develop tests which model any structural break of an unknown form as a smooth process via means of flexible Fourier transforms (i.e., an expansion of a periodic function in terms of an infinite sum of sines and cosines). Several authors, including Gallant (1981), Becker et al. (2006), Enders and Lee (2012), and Christopoulos and León-Ledesma (2010), show that a Fourier approximation can often capture the behavior of an unknown function even if the function itself is not periodic. The authors argue that their testing framework requires only the specification of the proper frequency in the estimating equations. By reducing the number of estimated parameters, they ensure that the tests have good size and power irrespective of the time or shape of the break. Recently, there is a growing consensus that macroeconomic variables exhibit nonlinearities and, consequently, conventional unit root tests, such as the ADF test, have low power in detecting mean reversion. To solve this problem, non-stationary tests based on a nonlinear framework must be applied. Ucar and Omay (2009) proposed a nonlinear panel unit root test by combining the nonlinear framework in Kapetanios et al. (2003, KSS) with the panel unit root testing procedure of Im et al. (2003), which has been proved to be useful in testing the mean reversion of time-series data. Hence, this empirical study applies panel KSS test with a Fourier function, using the sequential panel selection method (SPSM) procedure, to investigate the time-series properties of real interest rate differentials of East Asian countries relative to China.

The aim of this study contributes significantly to this field of research because, first, to the best of our knowledge, this study is the first of its kind to utilize the panel KSS unit root test with a Fourier function through the SPSM procedure to examine evidence for RIRP for East Asian countries relative to China. Secondly, it is well-known that independence is not a realistic assumption in that the real interest rate of different countries may be contemporaneously correlated. To control for any cross-section dependence found among the data sets, we approximate the bootstrap distribution of the tests and this is not done in the previous study which assume that the individuals are cross-section independent. O'Connell (1998) has in fact shown that the true size of both tests can be far greater than the normal size when the underlying data-generating process (DGP) is characterized by cross-section dependence. With these, the current research hopes to fill the existing gap in the literature. The empirical results indicate that the RIRP holds true for five of the studied East Asian countries relative to China and our results have important policy implications

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[1] China is now the second largest economy in the world, only behind the U.S. It is also the third largest in terms of trade and foreign direct investment (FDI) inflows.