Economic Modelling 33 (2013) 204–208

Contents lists available at SciVerse ScienceDirect

Economic Modelling

journal homepage: www.elsevier.com/locate/ecmod

Uncovered interest parity and risk premium convergence in Central and Eastern European countries ☆

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ARTICLE INFO

Article history:
Accepted 8 April 2013

Keywords:
Non-linear threshold unit-root test
Uncovered interest parity
Risk premium

ABSTRACT

This study applies non-linear threshold unit-root test to investigate the non-stationary properties of the uncovered interest parity (UIP) with risk premium for ten Central and Eastern European (CEE) countries. We find that non-linear threshold unit-root test has higher power than linear method suggested by Caner and Hansen (2001) if the true data generating process of risk premium convergence is in fact a stationary non-liner process. We examine the validity of UIP from the non-linear point of view and provide robust evidence clearly indicating that UIP holds true for seven countries. Our findings point out that capital mobility and exchange market efficiency are in these CEE countries with non-linear way.

1. Introduction

The Central and Eastern European (CEE) countries have faced a serious transformation downturn followed by considerable economic growth. To catch up with European Union (EU) countries in economic growth is a natural goal for the relatively poor CEE countries, yet which at the beginning of the 1990s reached only 20–40% of Germany's per capita GDP. Although there has been some progress of the CEE countries in comparison to the EU member countries during the second half of 1990s, significant economic gap still exists and the average per capita income is still way less than that in EU member countries. As economic integration is an integral part of functions for the EU, many of the CEE countries have expressed their strong intention to join the European Monetary Union (EMU). In addition, the prospects of EU membership have also stimulated economic growth, as the political risk premium was sharply reduced and capital inflows started to rise in several CEE economies. The EU single market and financial market integration in particular reduce barriers to capital flows, which results in stronger links between the foreign exchange market and the interest rate market. Stronger links indicate that central banks must also take this aspect into account when making decisions in terms of interest rate and money supply, as these decisions can have undesirable/negative impacts on the whole financial market. Moreover, the idea of granting CEE countries membership in the EMU may disturb price stability when there is no convergence of its long-term interest rate to the average interest rate, so in order to realize the convergence, the CEE countries must adjust their monetary policies in the direction of the core of the EMU countries. Under the conditions of uncovered interest parity (UIP), long-term interest rate differentials are equal to expected exchange rate differentials across countries. Consequently, evidence of long-term interest rate convergence between CEE countries and the core of the EMU can be interpreted as long-run monetary policy convergence of the CEE countries to the EMU policies. Such knowledge has practical implications concerning the process of evaluating the preparedness of CEE countries to join the EMU.

Earlier empirical literature on the UIP condition mostly focuses on developed economies rather than emerging markets because of lack of data (Pasricha, 2006). Recently, increases in the degree of financial liberalization in emerging markets enabled many researchers to analyze foreign exchange market efficiency in these economies (Alper et al., 2007). The examination of UIP among CEE countries and other European transition countries has received considerable attention and has been studied from a variety of approaches. Unfortunately, due to different approaches and spans thus far none has been proven to be conclusive. Flood and Rose (1996) use the UIP test to examine European currencies in both fixed and flexible exchange rate regimes and they find that a large amount of the forward puzzle vanishes for fixed currency regimes. Choudry (1999) investigates forward market efficiency using UIP, and finds that there is no forward puzzle in at least some cases. Bansal and Dahlquist (2000) find that the forward puzzle disappears for many emerging economies. Using forward market data for emerging markets, Frankel and Poonawala (2006) analyze the forward premium bias explicitly for developed and emerging market

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http://dx.doi.org/10.1016/j.econmod.2013.04.025

economies and document that forward premium bias is less severe in emerging markets. Ferreira and León-Ledesma (2007) find evidence of interest rate in a sample of industrialized and emerging economies applying nonlinear unit root tests, and for OECD countries applying panel unit root tests with structural changes, respectively. Mansori (2003) explores whether the introduction of euro and the adoption of accession partnerships with the EU have an effect on the UIP condition for the Central European economies. His findings suggest that the UIP condition holds for the period 1994–2002, and the analyzed structural breaks seem to matter. Dickinson and Mullineux (2001) provide an overview of financial integration between the CEE countries and point out that most of those countries' monetary and exchange rate policy on financial markets increase convergence of the financial systems with the EU.

Since the collapse of the Bretton Woods system, the global integration of the financial and goods market has increasingly become to be a most significant and profound phenomenon in the world economy. Consequently, the global financial markets have gradually been linked and therefore an integrated international capital market is forming. From the theoretical view, in a one-world market, because of the free capital allocation of the investors, the arbitrage occasions can be reduced. With the development of the interdependence among national markets, the country-specific interest rate spread should exhibit a convergence trend in the long run. Such complete convergence is known as the UIP hypothesis. If the UIP holds, that means a no-arbitrage condition between investing in a domestic currency denominated asset and a foreign currency denominated asset. 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, and then may 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). Otherwise, the violation of the UIP indicates that capital markets are not efficient and there is a possibility of arbitrage opportunity (Cook, 2009). In this study, we analyze whether UIP holds in CEE countries due to their increasing importance in view of joining with the EU or EMU. The economic transition features of CEE countries provide an interesting study of UIP hypothesis test. First, there were centrally planned and fast liberalization to prices and markets, and some suffered from high inflation. Second, and most of all, the initial conditions for CEE countries' transition varied extensively and they may be an important indicator in explaining the magnitude of deviations from UIP. The issue of monetary policy coordination is important for the European Monetary System. It is the reason that policy coordination and the resulting monetary policy convergence would be necessary for successfully enlarging the Euro currency area. Hence, empirical evidence regarding the state of monetary policy convergence will be helpful for political decision makers.

In particular some research was done on the field of measuring the impact of international business cycle to small open economy; see Smith and Summers (2005), Artis et al. (2007), and Chen and Shen (2007). Also purchasing power parity hypothesis was considered on the field of nonlinear cointegration approach; see Sarno et al. (2004) and Peel and Venetis (2005). Some authors revisited very fundamental and old money-output causality hypothesis and provided empirical testing on the basis of nonlinear models; see Escribano (2004), Haug and Tam (2007), Seo (2006), and Kapetanios et al. (2006). Empirical evidence on the stationary of the interest and exchange rate convergence is abundant, but unfortunately, thus far, there are none conclusive. For previous studies, one possible explanation for the inconsistencies in the existing empirical evidence on the UIP hypothesis is that the prior studies implicitly assume that interest and exchange rate behavior is inherently linear in nature. It is well known that if interest and exchange rate differential follows a nonlinear stationary process then tests based on linear models such as the widely used augmented Dickey–Fuller (ADF) unit root models will be mis-specified (Chortareas et al., 2002). However, Sonora and Tica (2010) also demonstrate that the adoption of linear stationarity tests is inappropriate for the detection of mean reversion if the true process of the data generation of the interest rate is in fact a stationary non-linear process. The presence of nonlinear mean-reverting adjustment has been advanced by recent theoretical developments that emphasize the role of transaction costs, imperfect capital mobility and incomplete institutional reforms. An alternative view is that nonlinearity at the aggregate level is caused by other influences, such as the effects of official interest and exchange rate intervention. Additionally, the existence of structural changes in the UIP might imply broken deterministic time trends and the result is a nonlinear pattern (Cuestas and Harrison, 2010).

This study contributes significantly to this field of research because, first of all, we examine evidence for UIP for CEE countries, using the threshold autoregressive model (TAR) and the test statistics suggested by Caner and Hansen (2001). The main advantage of this procedure is that it allows one to simultaneously test for nonlinearities and nonstationarity. Secondly, to the best of our knowledge, this study is the first of its kind to utilize the threshold unit root test for long-run UIP in CEE countries. This empirical result provides strong evidence favoring the validity of UIP for the 7 CEE countries being studied. This useful information is important that it reveals how participants in financial markets assess the convergence status of the CEE countries. Costs and benefits of EMU enlargement will depend inter alia on financial markets' confidence in the proper selection of new EMU members, and public confidence is reflected in convergence of interest rates and exchange rate stability. Moreover, it describes monetary convergence and monetary policy strategies of the European integration process.

The remainder of this study is organized as follows. Section 2 describes the UIP theory and methodology of the non-linear threshold unit root test. Section 3 presents the data used in our study and discusses the empirical findings. Finally, Section 4 reviews the conclusions we draw.

2. The theory of uncovered interest parity & threshold unit-root test methodology

The UIP theory states that the interest rate differential between two countries has to equal the expected change in the exchange rate (Krugman and Obstfeld, 2003). Denote the domestic nominal interest rate per annum in period t by i_t, the corresponding interest rate of the reference country by i_t^*, and the exchange rate in terms of domestic currency per reference currency by S_t, then UIP can be written as:

$$i_t - i_t^* = \frac{S_{t+k}^e - S_t}{S_t} \tag{1}$$

where k is the maturity related to the exchange rates, and superscript e indicates expected values. Domestic and foreign interest rates have to be identical with respect to maturity, uncertainty, default probability etc. of the corresponding asset. According to UIP, a higher domestic interest rate indicates an expected devaluation of the domestic currency while a lower domestic rate than the reference interest rate indicates an expected appreciation of the domestic currency.

However, this strict form of UIP can only be expected to hold, if foreign and domestic currencies are perfect substitutes. This is rather seldom the case such that the relation has to be augmented by a country-specific and possibly time varying risk premium λ_t:

$$\lambda_t = (i_t - i_t^*) - \frac{S_{t+k}^e - S_t}{S_t}. \tag{2}$$

The risk premium is positive if the domestic interest rate is higher than UIP predicts. The time path of λ_t can ex post be interpreted as an