



Real interest rate parity hypothesis in post-Soviet countries: Evidence from unit root tests



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ABSTRACT

In this paper we investigate the real interest parity hypothesis for ten post-Soviet transition countries with respect to Russia, the USA and Germany. For this purpose, we employ conventional linear unit root tests as well as a nonlinear unit root test developed by Kapetanios et al. (2003) to examine stationarity properties of real interest rate differentials of the transition countries vis-à-vis Russia, the USA, and Germany. The results provide evidence in favor of real interest rate parity for most of the series, especially when possible nonlinearities in the adjustment process are taken into account.

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1. Introduction

Real interest rate parity (RIRP) hypothesis is one of the most important hypotheses in international economics. According to the RIRP hypothesis, real rates of return on identical assets across countries will become equal provided that agents form expectations rationally and engage in arbitrage activities in goods and asset markets. The RIRP hypothesis is based on uncovered interest parity (UIP) and relative purchasing power parity (PPP). Therefore, the extent to which the RIRP hypothesis holds can serve as a measure of the degree of product and financial market integration (e.g., Alexakis et al., 1997; Chinn and Frankel, 1995; Obstfeld and Taylor, 2002).

The validity of RIRP hypothesis has important implications for policymakers, investors and economists. First, if the RIRP hypothesis holds, individual countries will be unable to affect their real interest rates that are set internationally. Since real interest rate is crucial for investment and saving decisions, the validity of the RIRP hypothesis limits the ability of monetary authorities to pursue an independent policy to affect real macroeconomic variables through the interest rate channel. Second, as briefly mentioned above, empirical fulfillment of the RIRP can be interpreted as an indication of international integration in goods and asset markets. Factor prices will tend to equalize in integrated goods and asset markets, leading to equality of real interest rates (see, for example, Awad and Goodwin, 1998; Chinn and Frankel,

1995; Obstfeld and Taylor, 2002; Phylaktis, 1999). Third, most models of exchange rate dynamics and open-economy macroeconomics often assume that RIRP holds as a valid approximation (e.g., Dornbusch, 1976; Frenkel, 1976; Mussa, 1976).¹ Therefore, the RIRP hypothesis is central to our understanding of open-economy macroeconomics. However, Fama and Farber (1979), Hansen and Hodrick (1980) and Dornbusch (1983) argued that RIRP hypothesis may not hold, emphasizing varying risk premia on similar securities across countries. Similarly, the existence of non-tradable goods may prevent real interest rates to be equal across countries. Finally, investors might also be interested in RIRP because this condition may be used to simplify hedging practices for financial investment and international portfolio diversification decisions (e.g., Balke and Wohar, 1998).

The empirical validity of the RIRP has been extensively investigated in the literature. However, the evidence is mixed. Mishkin (1984), Cumby and Obstfeld (1984) and Cumby and Mishkin (1986), among others, have tested the validity of the RIRP hypothesis for the OECD countries vis-à-vis the US. Their results indicate very limited support for the RIRP hypothesis. Crowder (1995) and Mc-Donald and Taylor (1989) could not find any evidence in favor of RIRP for high-income countries. On the other hand, Cavaglia (1992), Holmes (2002), and Wu and Chen (1998) found that RIRP holds for developed countries. Similarly, Chinn and Frankel (1995) concluded that the RIRP holds for most of the Pacific Rim countries.

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¹ See Pentecost (1993) for a survey of exchange rate determination theories.

Controversial results in the empirical literature were attributed to the inadequacy of the methods used in these studies. For example, [Dumas \(1992\)](#) pointed out that while adjustments in the financial markets are rapid, it is sluggish and costly in the goods markets. In addition, the presence of transaction costs may prevent agents to engage in profitable arbitrage activities, which is seen as the driving force behind the RIRP hypothesis. If the disparities between the real interest rates across countries are too large, then agents will engage in arbitrage activities in goods and assets markets, and thus real interest rates will become equal. This implies that an adjustment to the equilibrium levels might be nonlinear. Asymmetric monetary policy reactions (e.g., [Dolado et al., 2004](#); [Hasanov and Omay, 2008](#); [Taylor and Davradakis, 2006](#)) may also cause nonlinearities in real interest rates. In fact, recent studies of [Holmes and Maghrebi \(2006\)](#), [Ferreira and León-Ledesma \(2007\)](#), and [Cuestas and Harrison \(2010\)](#) provide some evidence of nonlinearities in real interest rate differentials for various groups of countries.

In this paper, we investigate the validity of the RIRP hypothesis for ten post-Soviet transition countries, namely for Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, and Ukraine. For this purpose, we employ both linear and nonlinear unit root tests to investigate the stationarity properties of the real interest rate differentials of these countries vis-à-vis the USA, Germany, and Russia. Although the validity of the RIRP hypothesis has been analyzed for Central and Eastern European (CEE) transition countries ([Argyrou et al., 2009](#); [Cuestas and Harrison, 2010](#); [Holmes and Wang, 2009](#)), to the best of our knowledge it has not been analyzed yet for the ex-Soviet republics despite their growing importance and integration to the world economy. In addition to filling a gap in the empirical literature, an examination of the RIRP for these countries has important implications. These countries have been implementing massive reforms aimed at liberalizing their economies and integrating them to the rest of the world. Most of the sample countries have joined various regional economic and political organizations such as the Commonwealth of Independent States, Common Economic Space, Customs Union, and the Eurasian Economic Community. Especially, Belarus, Kazakhstan, and Russia are cooperating tightly to integrate their economies and establish a common market, which could ultimately lead even to a single currency. On the other hand, other countries such as Azerbaijan, Georgia, Moldova and Ukraine restrain from joining such regional economic organizations and customs union, and cooperate with the European Union within the European Neighborhood Policy and Eastern Partnership program. Since the fulfillment of the RIRP hypothesis can be regarded as a measure of international integration in goods and assets markets, the results of this study may be used to assess the degree of integration of each of the sample countries to the world economy, and to assess the feasibility of such regional integration processes. Furthermore, since the RIRP hypothesis suggests that domestic real interest rates are linked to international interest rates, fulfillment of the RIRP hypothesis would imply that monetary policy in those countries will have no effect on real interest which is crucial for investment decisions. In addition, the results of this study might be of interest to investors looking for international portfolio diversification.

The paper is organized as follows. [Section 2](#) briefly reviews the real interest parity theory. [Section 3](#) discusses econometric methodology. [Section 4](#) provides and briefly discusses empirical results. [Section 5](#) concludes.

2. Real interest parity theory

Real interest parity theory rests on Uncovered Interest Parity (UIP) and purchasing power parity (PPP) hypotheses. The UIP relates the difference between domestic and foreign interest rates to the expected rate of depreciation of exchange rate. According to the UIP hypothesis,

the interest rate differential should be equal to the expected rate of depreciation of the exchange rate. That is,

$$\Delta s_t^e \approx i_t - i_t^* \quad (1)$$

where Δs_t^e is the expected rate of depreciation of the exchange rate, i.e., $\Delta s_t^e = \frac{s_t - s_{t-1}}{s_{t-1}} - 1$. i_t and i_t^* are the domestic and foreign interest rates, respectively. According to PPP, the change in exchange rate should be equal to inflation differential over the same period.

$$\Delta s_t = \Delta p_t - \Delta p_t^* \quad (2)$$

Δp_t and Δp_t^* refer to domestic and foreign inflation rates, respectively. Finally, rational expectation hypothesis is represented by the following equation:

$$\Delta s_t^e = \Delta s_t + \varepsilon_t \quad (3)$$

where ε_t is a white-noise disturbance term with variance σ_ε^2 . The joint set of (1), (2) and (3) can be used to imply

$$i_t - i_t^* = \Delta p_t - \Delta p_t^* + \varepsilon_t. \quad (4)$$

Eq. (4) can also be rewritten as

$$i_t - \Delta p_t = i_t^* - \Delta p_t^* + \varepsilon_t. \quad (5)$$

Under the Fisher equation $r_t = i_t - \Delta p_t$ and $r_t^* = i_t^* - \Delta p_t^*$ which define real interest rate as nominal interest rate less expected inflation over the same period, we obtain the real interest parity relationship:

$$r_t = r_t^*. \quad (6)$$

Eq. (6) states that under PPP and UIP hypotheses, real interest rates must be equal across countries. If real interest differential is defined as:

$$y_t = r_t - r_t^* \quad (7)$$

then Eq. (5) can be rewritten as

$$r_t - r_t^* = y_t = \varepsilon_t. \quad (8)$$

Eq. (8) suggests that real interest rate differentials follow a white-noise process. Economists generally acknowledge that real interest rate differential may not be equal to zero at every point of time because of adjustment costs or other market imperfections, but instead it follows a stationary I(0) process (e.g., [Cuestas and Harrison, 2010](#); [Ferreira and León-Ledesma, 2007](#); [Goldberg et al., 2003](#)).

3. Econometric methodology

The empirical validity of the RIRP hypothesis can be tested by examining stochastic properties of real interest rate differentials. As briefly discussed above, the RIRP hypothesis implies that real interest rate differentials follow an I(0) process. Whether Real interest rate differentials follow a stationary I(0) process or a unit root process can be tested by applying conventional augmented Dickey-Fuller (ADF) test proposed by [Dickey and Fuller \(1979\)](#). The ADF test is based on the following regression equation:

$$\Delta y_t = \alpha_0 + \varphi y_{t-1} + \sum_{i=2}^p \beta_i \Delta y_{t-i+1} + \varepsilon_t, \quad (9)$$

where Δ is the difference operator, α , ϕ and β_i are the parameters to be estimated. Then, the null hypothesis of unit root ($H_0 : \phi = 0$) against alternative of a stationary process ($H_1 : \phi < 0$) can be tested using the conventional t-ratio for ϕ as $t_\phi = \hat{\phi}/s.e.(\hat{\phi})$, where $\hat{\phi}$ is the estimated

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