Economic Modelling 60 (2017) 132–137

Contents lists available at ScienceDirect

Economic Modelling

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

Inflation-targeting and real interest rate parity: A bias correction approach

Hui Ding, Jaebeom Kim*

Department of Economics, Oklahoma State University, Stillwater, OK74078, USA

ARTICLE INFO

JEL classification:
F30
F31
C32

Keywords:
Real interest rate parity
Inflation-targeting
Recursive mean adjustment
Cross-sectional dependence
Panel unit root
Half-life

ABSTRACT

This paper investigates whether inflation-targeting influences real interest rate parity (RIP) by a bias correction approach under cross-sectional dependence. The recursive mean adjustment (RMA) method proposed by So and Shin (1999) and Shin and So (2001) is employed to correct the downward bias in the panel unit root tests and in the half-life estimates of real interest rate differentials for traded and non-traded goods. The empirical findings differ depending on whether we apply the RMA. More importantly, the empirical results show that as more homogeneous economies become involved in terms of inflation-targeting regime, stronger mean reversion and much a tighter confidence interval are present. Thus, inflation-targeting plays an important role in providing favorable evidence for long-run RIP.

1. Introduction

The present paper examines whether inflation-targeting influences real interest rate parity (RIP) by a bias correction approach under cross-sectional dependence. RIP comprises uncovered interest parity (UIP) and purchasing power parity (PPP), which together imply the equalization of real rates of return in foreign exchange markets. Indeed, the assumption of the equality of real interest rates across countries characterized by a high degree of capital mobility together with high levels of technology diffusion served as an important premise in early monetary approaches to exchange rate determination.[1] RIP has also been used to investigate an array of key questions in open-economy macroeconomics regarding the efficiency of capital allocation, the volatility of consumptions, and economic growth. Although the theoretical importance of RIP as well as its validity for analyzing issues related to fiscal and monetary policy are important, empirical support for RIP in the literature is elusive.

A number of studies of OECD countries provide support for long-run RIP based on panel data.[2] One common explanation for this finding is that increasing the amount of information on real interest rates typically increases the power of unit root tests and overcome the issue of the low power of early univariate unit root studies.[3] On the other hand, Rose (2014) shows that the existence of bond market under inflation-targeting is associated with stable inflation because it creates an effective safeguard for low inflation.[4] As shown by Svensson (2000), Mishkin and Schmidt-Hebbel (2007), and Kim (2014), the high degree of transparency and accountability of monetary policy limits not only variability in inflation but also that in the real exchange rate at a long horizon, thereby stabilizing real exchange rates to a significant amount relative to the cases under other monetary regimes.

Various industrial and emerging countries have explicitly used an inflation target as their nominal anchor since New Zealand adopted inflation-targeting in 1990.[5] As shown by Svensson (2000) and Mishkin and Schmidt-Hebbel (2007), what made this monetary policy regime special was the explicit public commitment to stabilizing inflation as the main policy target and the emphasis on monetary policy transparency and accountability. This new monetary policy regime is characterized by (1) explicit quantitative inflation targets, (2) a policy approach based on a forward-looking assessment, namely use of an internal conditional inflation forecast as an intermediate target variables, and (3) a high degree of transparency and accountability.[6]

* Corresponding author.
E-mail addresses: hui.ding@okstate.edu (H. Ding), jb.kim@okstate.edu (J. Kim).

[1] See Dornbusch (1976) and Mussa (1982) for details.
[2] See Wu and Chen (1998) and Taylor and Taylor (2004) for details.
[3] However, Taylor and Sarno (1998) issue an important warning related to the spurious interpretation of findings derived from panel data.
[4] Inflation-targeting is a monetary policy in which a central bank has an explicit target inflation rate. For details regarding bond markets and inflation-targeting, see Rose (2014).
[5] Today 26 countries use IT. See Roger (2010) and Mishkin and Schmidt-Hebbel (2007) for details.
[6] See Svensson (2000) and Mishkin and Schmidt-Hebbel (2007) for details.

http://dx.doi.org/10.1016/j.econmod.2016.09.016
Received 12 April 2016; Received in revised form 24 August 2016; Accepted 25 September 2016
Available online 15 October 2016

Svensson (2000) provides a theoretical framework for a small open economy with exchange rate channels for the transmission of monetary policy to inflation and shows evidence that since inflation-targeting reduces variability in relative prices, the long-run unconditional variances of real exchange rates in flexible inflation-targeting cases are smaller than those in other cases.[7] Further, empirical evidence including Mishkin and Schmidt-Hebbel (2007) on the link between inflation-targeting and particular measures of economic performance also shows that inflation-targeting is associated with an improvement on overall economic performance in that inflation levels, inflation volatility, and interest rates have declined after countries adopted inflation targeting. The important hypothesis in the present study is that if the theory and evidence were right and at the same time if PPP were to hold better and the bond market were correlated with low inflation in countries under inflation-targeting, inflation-targeting would play an important role to provide favorable evidence for RIP.

One fundamentally and empirically important issue to the present study is the degree to which the movements of goods and capital markets across countries can be measured by the level of economic integration. The answer to this question depends on the degree of economic integration between markets across economies. Because of the high persistence of interest rates as well as of goods' prices, least squares (LS) estimates of parity might appear to suffer from a downward bias in the persistent coefficient, implying that the parity condition is estimated spuriously to be less persistent than it actually is. In order to correct this bias, Andrews (1993), Andrews and Chen (1994) and Hansen (1999) have proposed approaches such as the median-unbiased estimator and grid bootstrap methods, respectively. However, while this potential bias has been recognized in the time series literature ever since the seminal findings of Kendall (1954), no empirical study has thus far carried out an estimation of bias-correction in order to examine the influence of inflation-targeting on RIP.

The other important point in question for understanding the parity condition is cross-sectional dependence. Panel unit root tests have been widely employed to investigate PPP and RIP, however, the results of such tests with cross-sectional dependence lend little support to PPP or RIP in contrast to tests without cross-sectional dependence.[8] Furthermore, Phillips and Sul (2003) show that if there exists serious cross-sectional dependence in the data and it is ignored in estimation, estimation efficiency can decrease so that the panel LS estimator may provide little efficiency gain over the single equation LS. Thus, it is interesting to examine whether inflation-targeting has a significant role for RIP in addition to other factors such as price indices and bias-corrected cross-sectional dependence in the panel data.

To test the influence of inflation-targeting in this regard and to estimate the half-life,[9] we use recursive mean adjustment (RMA) proposed by So and Shin (1999). According to So and Shin, the RMA estimator is computationally convenient and powerful, and has been employed in many studies. For instance, among many others, Taylor (2002) employs the RMA based seasonal unit root test and Sul et al. (2005) use RMA for heteroscedasticity and autocorrelation consistent estimation.[10] Further, Choi et al. (2010) develop a RMA based bias correction method for dynamic panel data and Chudik and Pesaran (2015) apply RMA to common correlated effects approach for heterogeneous panel data models with lagged dependent variable. They find that the proposed estimators have satisfactory performance to correct the bias.[11]

In this study, the bias-correction method is applied to the cross-sectionally augmented versions of the tests of Im et al. (2003) (IPS) and Pesaran (2007) (CIPS) for panel data. The RMA method is also used to estimate the convergence rates to RIP for inflation-targeting and non-inflation-targeting countries correctly without bias. Moreover, in order to avoid possible aggregation bias because of heterogeneous dynamics in cross-sector aggregate prices, we use sectoral consumption data by type and implicit deflators for durable goods' and service consumptions to construct the real interest rates for durables and service consumption, respectively among seven industrialized countries.[12] Comparisons are made, together with durables and service consumption including producer price index (PPI) and consumer price index (CPI), between inflation-targeting and non-inflation-targeting, and with and without cross-sectional dependence.

The empirical findings based on the results of the panel unit root tests presented herein differ depending upon whether we use RMA, as do the convergence rates in terms of the half-life estimates. Despite the price indices, numeraire currencies, and cross-sectional dependence, the half-life estimates consistently show that inflation-targeting countries have shorter half-lives than non-inflation-targeting countries, while those for all countries lie in between. The empirical results further show that inflation-targeting lowers the variability in real interest rates, providing more favorable evidence for RIP, as more inflation-targeting countries become involved. Further, especially under inflation-targeting, the result is not likely to be sensitive to numeraire currencies, price indices, or cross-sectional dependence; however, correcting for bias does not increase the tendency to reject the unit root hypothesis with cross-sectional dependence in our sample.

2. Econometric model and estimation

RIP involves both UIP and PPP.

$$r_t - r_t^* = \epsilon_t \tag{1}$$

where $r_t = i_t - (p_{t+1}^T - p_t^T)$, $r_t^* = i_t^* - (p_{t+1}^{T*} - p_t^{T*})$, i_t (i_t^*) is the domestic (foreign) nominal interest rate and p_t^T (p_t^{T*}) is the log of the domestic (foreign) price of traded goods at time t.[13] Under the condition of perfect arbitrage in the traded goods and capital markets, Eq. (1) is relevant for tests of international parity. Given the fact that the composite error that arises from expectational errors in UIP, conditional on the current information set, is stationary, Eq. (1) indicates that *ex post* RIP, defined in terms of traded goods between domestic and foreign countries, holds.[14]

To test the long-run relationship in (1), first we consider the following regression:

$$\epsilon_t = \alpha + \beta\epsilon_{t-1} + e_t \tag{2}$$

where ϵ_t is the real interest rate differential at time, t, and e_t is a white noise error. As mentioned above, potential downward bias exists in the LS estimator for β and this can become particularly severe as the true value of the parameter approaches unity. To overcome this bias, we use the RMA estimator proposed by So and Shin (1999) and Shin and So (2001). By defining the recursive mean, $\bar{\epsilon}_{t-1} = (t-1)^{-1}\sum_{k=1}^{t-1}\epsilon_k$ and rewriting Eq. (2) we derive:

$$\epsilon_t - \bar{\epsilon}_{t-1} = \beta_{RMA}(\epsilon_{t-1} - \bar{\epsilon}_{t-1}) + e_t \tag{3}$$

[7] He considers four different IT cases. See Svensson (2000) for details.

[8] See O'Connell (1998) and Moon and Perron (2007) for details.

[9] Half-life measures the number of years for a shock to decay by 50%.

[10] Kim and Moh (2012) also provided with empirical evidence of more powerful RMA based unit root tests.

[11] In addition, Choi et al. (2010) explain why the RMA method works well when the dominant root is near unity among several bias correction methods.

[12] We implicitly assume that sectoral heterogeneity can induce different convergence rates in our data like traded and non-traded goods. See Imbs et al. (2005) for details.

[13] To see this, UIP between two countries can be shown as $i_t - i_t^* = s_{t+1} - s_t + \epsilon_t$ where s_t is the natural logarithm of the exchange rate between a domestic and a foreign country (domestic price of foreign currency), $\epsilon_t = E(s_{t+1}|I_t) - s_{t+1}$ is a composite error term assumed to be white noise, and $E(\cdot|I_t)$ is the conditional expectations operator based on the information at time t. PPP for traded goods is $s_t = p_t^T - p_t^{T*}$. Combining these two yields Eq. (1).

[14] Differential tax treatment and transactions costs may result in the existence of a neutral band for financial market speculation within which profitable trading opportunities are impossible. Thus, international financial integration will result in the stationarity of real interest rate differentials. For details, see Wu and Chen (1998).