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The Integration of Financial Markets in GCC Countries

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The real interest parity (RIP) condition states that the interest rate differential between two economies is equivalent to the differential between the forward exchange rate and the spot exchange rate. This study examines the integration of financial markets in the GCC countries by verifying the validity of RIP in their economies. Using univariate and different panel unit root tests, we find evidence supporting the RIP theory, which indicates that the financial markets in these countries are well integrated and that the adoption of a common currency would be relatively easy.

JEL classification: F21; F36; C23
Keywords: Real Interest Parity, GCC Countries, Panel Unit Root Tests, Monetary Union

1. INTRODUCTION

The launch of the European Monetary Union in 1999 gave new impetus to the idea of establishing a common currency among six Gulf countries.[1] At the 2000 Bahrain Summit, the Gulf Cooperation Council (GCC) leaders approved the US dollar as a common peg to their currencies to stabilise exchange rates among member countries. It was further planned that the GCC states would work towards launching a single currency in 2010. Since then, there have been some setbacks to these arrangements: Oman pulled out of the plan in 2006 and Kuwait adopted a managed floating exchange rate regime in 2007. The recent decision of the United Arab Emirates to withdraw from the GCC monetary union in 2009 was another major blow to the planned monetary union. Despite these hindrances, many believe that the plan will materialise, though it may take longer than initially expected.

Examining the extent of market integration among GCC members is important for a successful and beneficial monetary union among these countries. Louis, Balli, and Mohammad (2008) test the symmetry of aggregate demand and non-oil aggregate supply shocks in the Gulf countries. They find that demand shocks are clearly symmetrical but that non-oil supply shocks are weakly symmetrical across these countries, which favours the idea of a monetary union. In a recent paper, Espinoza, Prasad, and Williams (2010)

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[1]Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates are members of the GCC.

investigate the extent of financial integration among GCC members, and their results generally support regional integration. Based on equities data on cross-listed stocks, they find that stock markets are fairly well integrated compared to other emerging market regions. The results on the basis of interest rate data also indicate that convergence exists and that any difference in the interest rates of these countries is relatively short-lived.

The current study attempts to examine the extent of market integration among GCC members by testing for the presence of a well-known condition of interest parity, using univariate and other panel unit root tests.

It is well documented that unit root tests have low power in small sample sizes and often fail to distinguish nonstationary series from stationary series. The utilisation of panel data helps us resolve this issue by increasing the number of data observations. The second benefit of panel unit root tests comes from certain circumstances where data allows better control for unobservables that would otherwise spoil the regression estimation. Levin, Lin, and Chu (2001) demonstrate that, in a Monte Carlo simulation, asymptotic results approximate to the test statistics in panels of moderate size, and the power of a panel unit root test is considerably higher than that of a unit root test for each individual time series that has a non-standard asymptotic distribution. A compression of both types of tests in the application of real interest parity (RIP) in this study reinforces this notion. Moreover, no other study has used this methodology to test for the integration of financial markets in GCC countries; this study therefore represents another contribution to the literature.

RIP theory is a cornerstone of assessing the efficiency of foreign exchange markets, linking interest rates, spot exchange rates, and foreign exchange rates. It combines two fundamental theories: ex ante purchasing power parity (PPP) and uncovered interest parity (UIP). RIP theory hypothesises that, if economic agents have rational expectations and goods and financial markets arbitrage is operational, the real interest rates between countries will match one another.

Validating the theory is important in the sense that the equality of real interest rates reflects international integration of goods and assets markets, or alternatively indicates the presence of frictionless markets. Successful empirical evidence of the theory implies that the scope for international portfolio diversification is minimal and that the role of monetary policy as a stabilising tool is restricted to the degree that it influences the foreign real interest rate.

The present study analyses the convergence of real interest rates in GCC countries using two types of exchange rates: the US dollar and Japanese yen. The GCC countries have been considering the integration of their goods and financial markets since 1981. Many of their macroeconomic indicators follow similar patterns and the countries are about to form a monetary union. Their economic and institutional organisation and markets are very similar because of their economies' heavy dependence on the oil sector, their fixed exchange rate to the US dollar,[2] and heavy reliance on imported labour. The validity of RIP in these economies indicates that capital mobility exists among member countries and that their financial markets are well integrated. Additionally, it makes the adoption of a single currency in the region relatively easy and the cost of replacing a national currency with a common currency, minimal.

[2]Kuwait follows an exchange rate arrangement where its currency is pegged to a basket of currencies.

The remainder of the paper has five sections. The literature on RIP is presented briefly in Section 2. Section 3 presents a theoretical model of RIP. Section 4 discusses the empirical methodology. The details of data and estimation results are given in Section 5. Section 6 concludes the paper.

2. A BRIEF OVERVIEW OF THE LITERATURE

Since the pioneering papers of Mishkin (1984), Cumby and Obstfeld (1984), and Cumby and Mishkin (1987), there has been a burgeoning interest in testing the RIP hypothesis. Though the studies mentioned above have generally rejected the RIP condition for the short run, Dreger and Schumacher (2003) and Arghyrou, Gregoriou and Kontonikas (2007) believe that RIP is a long run attractor for real interest rates for the European Monetary Union. Studies by Gagnon and Unferth (1995), Ong, *et al.* (1999), Evans, *et al.* (1994), Chinn and Frankel (1995), Alexakis, *et al.* (1997), Cavaglia (1992), Phylaktis (1999), Awad and Goodwin (1998), Frankel and Okongwu (1995), Fujii and Chinn (2000) and Jorion (1996) conclude that the differences in real interest rates across countries are relatively temporary and mean-reverting but different from zero in the long run. Edison and Pauls (1993) find a unit root in the real interest rate differential, while Cavaglia (1992) and Wu and Chen (1998) report mean reversion in real interest differentials. Ferreira and Léon-Ledesma (2003) show the presence of RIP in industrialised and emerging economies. Their study finds evidence of strong market integration in developed countries while a non-zero mean indicates the presence of a risk premium for emerging markets. Studies such as Goodwin and Grennes (1994), Holmes (2002), Mancuso, Goodwin, and Grennes (2003), Carrion-i-Silvestre and Tamarit (2006), and Ahmad (2010) reveal that convergence is subject to non-linearities and structural breaks. Some favour the use of short-term interest rates while others have verified the existence of RIP using long-term rates.

3. THEORETICAL MODEL

To formally derive a simple version of real PPP, we use Fisher's equation for both its domestic and foreign counterparts [Moosa and Bhatti (1996)].

$$E_t[R_{t+1}] = i_{t,t+1} - E_t[\pi_{t+1}] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

$$E_t[R^f{}_{t+1}] = i^f{}_{t,t+1} - E_t[\pi^f{}_{t+1}] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

In Equation 1, E_t represents rationally formed expectations in the current period while R_{t+1} is the ex ante real interest rate with one period to maturity. This real rate is the difference between the actual nominal interest rate $i_{t,t+1}$ minus expected inflation π_{t+1}. Equation 2 gives the same information except that the superscript f denotes the foreign counterpart.

The UIP condition states that the expected change in the spot exchange rate (e_t) will be a result of movements in capital flows due to the interest rate differential in the relevant economies.

$$E_t([e_{t+1}] - [e_t]) = i_{t,t+1} - i^f{}_{t,t+1} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

where e_t is the logarithm of the units of the domestic currency price of the foreign currency. This version of UIP assumes that investors are risk-neutral and that foreign and domestic assets are perfect substitutes. [For other versions of UIP, see Emre, Pinar, and Salih (2007)].

We can introduce ex ante PPP by writing the following equation:

$$E_t([e_{t+1}]-[e_t]) = E_t([\pi_{t+1}]-[\pi^f{}_{t+1}]) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

which states that expected movements in the spot exchange rate reflect the expected inflation differential between the home country and foreign country. This version of PPP assumes no barriers to trade and the absence of transportation costs, implying perfect commodity arbitrage. [See Ahmad and Rashid (2008) for a useful discussion on PPP].

Using Equations 1 and 2, we obtain a real interest rate differential between the two countries:

$$E_t([R_{t+1}]-[R^f{}_{t+1}]) = (i_{t,t+1}-i^f{}_{t,t+1}) - E_t([\pi_{t+1}]-[\pi^f{}_{t+1}]) \quad \ldots \quad \ldots \quad (5)$$

Now, combining the information in 3, 4, and 5 we have:

$$E_t([R_{t+1}]-[R^f{}_{t+1}]) = 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5a)$$

The equation above states that ex ante real interest rates in the domestic and foreign economy will be the same. However, in the presence of rational expectations the ex post real interest rate differential will be equal to the difference between potentially correlated forecast errors, which can be written as:

$$R_{t+1}-R^f{}_{t+1} = E_t[R_{t+1}]+\varepsilon_{t+1}-(E_t[R^f{}_{t+1}]+\varepsilon^f{}_{t+1}) = \varepsilon_{t+1}-\varepsilon^f{}_{t+1} \quad \ldots \quad \ldots \quad (6)$$

where ε_{t+1} and $\varepsilon^f{}_{t+1}$ are serially uncorrelated error terms with a zero mean. From the equation above, we can conclude that, if UIP and PPP hold and if agents form rational expectations, the difference between the disturbance terms will be equal to an unforeseeable error related to the forecast of exchange rate depreciation. It can also be noted that if this differential reverts to its mean value, any shock will be transitory. A higher value of the estimated convergent autoregressive root implies that shocks will have a longer impact. Even in the presence of mean reversion, there is still the possibility that this is a non-zero mean. Transportation costs, differentials in the risk premium across countries, tax rate differentials, financial contagion, and peso problems may result in convergence to a non-zero mean.

4. METHODOLOGY

The literature on testing for unit roots in panels is growing and many advances have been made in this field. Banerjee (2004), Baltagi and Kao (2000), and Choi (2004) provide a good review of the literature. In the first category of tests, often termed first-generation panel unit root tests, Levin, Lin, and Chu (LLC) (2002) and Im, Pesaran and Shin (IPS) (2003) have made notable contributions. These studies assume that idiosyncratic errors are cross-sectionally independent.

Instead, considering correlations across units as nuisance parameters, the second generation of tests uses these co-movements [Moon and Perron (2004), Bai and Ng (2004) and Pesaran (2007)].

The present study uses a variety of unit root tests to detect the presence of RIP among GCC countries. For comparison, we use a country-specific augmented Dickey-Fuller (ADF) and generalised least squares augmented Dickey-Fuller (ADF-GLS) test. The ADF-GLS test was proposed by Elliot, *et al.* (1996) and Ng and Perron (2001). Gutierrez (2006) finds this test more powerful than the ADF test. We then apply other panel unit root tests, including Maddala and Wu (1999), Breitung (2000), Choi (2001), LLC (2002), and IPS (2003). A brief introduction to these tests is given below.

The Breitung (2000) and LLC (2002) tests assume a common unit root process in the data series. They begin with a simple ADF equation:

$$\Delta y_{it} = \alpha y_{it-1} + \sum_{p=1}^{ki} \beta_{ip} \Delta y_{it-p} + z_{it}\gamma + \varepsilon_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

where $\alpha = k - 1$ or common unit root processes are assumed to exist. However, the lag orders are allowed to differ across the panel. The null hypothesis assumes that $\alpha = 0$ (or the presence of a unit root) while the alternative hypothesis assumes the series is stationary.

The proxies for Δy_{it} and y_{it} are used to obtain α in the LLC test. These proxies are standardised, free from autocorrelations, and follow a deterministic trend.

However, the Breitung test is distinguished from the LLC test in two ways. First, when constructing proxies for Δy_{it} and y_{it}, in contrast to the LLC test, only the autocorrelation component is removed from the proxies for Δy_{it} and y_{it}. Second, these proxies are de-trended and transformed. Once these modified proxies are attained, α can be estimated from the pooled proxy equation:

$$\Delta y_{it}^{*} = \alpha y_{it-1}^{*} + \nu_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

Breitung has shown that the estimate for α^* follows a standard normal distribution. Before estimation, the specification of numbers of lags in each cross-section ADF equation as well as exogenous regressors is required.

A second set of panel tests assumes that individual unit root processes exist across cross-sections or that k_i varies. In these tests, a panel-specific conclusion about the existence of a unit root is made on the basis of individual unit root tests. The IPS (2003) panel unit root test uses a separate ADF test for each cross-section to form a panel-specific statistic. The panel unit root statistic is obtained by taking the average of the t-statistics of the individual ADF statistic $\bar{t}_{NT}$. For the lag order zero in ADF equations, IPS have simulated critical values for diverse cross-sections and series lengths, and for equations including either intercepts or intercepts and time trends. For non-zero lags, IPS show that $\bar{t}_{NT}$ follows a standard normal distribution, which is as follows:

$$W_{\bar{t}NT} = \frac{\sqrt{N}\left(\bar{t}_{NT} - N^{-1}\sum_{i=1}^{N} E(\bar{t}_{iT}(P_i))\right)}{N^{-1}\sum_{i=1}^{N} Var(\bar{t}_{iT}(P_i))} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

where $E(\bar{t}_{iT}(P_i))$ and $Var(\bar{t}_{iT}(P_i)$ are the mean and variance of the ADF regression *t*-statistic, which are provided by IPS for various lags, lengths of series, and different test-equation assumptions.

In the third set of tests, Maddala and Wu (1999) and Choi (2001) use Fisher's (1932) results to derive tests that unite the *p*-values of individual unit root tests. Assuming $\hat{\lambda}_i$ is the p-value of any individual unit root test for cross section *i*, and under the null hypothesis that assumes that the unit root exists in all cross-sections, we obtain the following result asymptotically:

$$p = -2\sum_{i=1}^{N} \log(\hat{\lambda}_i) \rightarrow x^2_{2N} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

Additionally, Choi has demonstrated that:

$$Z = \frac{1}{\sqrt{N}}\sum_{i=1}^{N} \Phi^{-1}(\hat{\lambda}_i) \rightarrow N(0,1) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

where Φ^{-1} is the inverse of the standard normal cumulative distribution function.

5. DATA AND ESTIMATION

The data series for estimation are taken from *International Financial Statistics*, *World Development Indicators*, and the relevant country publications. Given that the interest rate data series for the UAE spanned only a few years, we have dropped it from our analysis. The RIP has been tested using two types of exchange rates: the US dollar and Japanese yen.[3] The interest rate series used in the analysis are: Kuwait (money market rate, 1981Q1-2008Q4), Saudi Arabia (deposit rate, 1986Q1-2009Q4), Bahrain (money market rate, 1985Q3-2006Q4), Oman (time deposit rate, 1986Q1-2009Q4), Qatar (deposit rate, 1981Q1-2009Q4), United States (T-bill rate, 1981Q1-2009Q4), and Japan (call money rate, 1981Q1-2009Q4). The selection of the data series and time period was influenced mainly by the availability of data. The inflation rate is formed as the annualised change of the consumer price index (CPI) from the last month of the previous quarter to the last month of the present quarter.

Table 1 presents the results of the univariate unit root tests to detect the presence of RIP in the GCC countries. For Bahrain, it is evident that, on the basis of the simple ADF test, the null of the unit root can be rejected at a 5 percent significance level using the US dollar. However, the ADF-GLS test result shows that this hypothesis cannot be rejected using either the US dollar or Japanese yen. For Kuwait, the null of the unit root cannot be rejected at the 5 percent significance level whether using the US dollar or Japanese yen exchange rate.

[3]The Euro area real interest rate was also tried but due to insufficient data observations (starting from 1998Q1) for the interbank rate (3 months), the results were not very meaningful. Therefore, the results for the Euro area were dropped from this analysis.

Table 1

Univariate Unit Root Tests Results

Country	ADF USA	ADF Japan	ADF-GLS USA	ADF-GLS Japan
Bahrain	*–3.5729**	–3.204	–3.0558	–2.377
Kuwait	*–2.624*	–2.539	–2.440	–2.92
Oman	*–3.372**	–1.17	–3.884*	–1.35
Qatar	*–3.95**	–3.582*	–3.4319*	–4.888**
SA	*–2.79*	–1.739	–2.828	–1.869
Critical Values (Trend)				
1%		–4.083	–3.671	
5%		–3.47	–3.106	

* and ** indicate rejection of the null hypothesis of non-stationarity at 5 percent and 1 percent levels of significance. All estimates include intercept and time trend. Optimal number of lags is selected on the basis of SIC.

The results for Saudi Arabia are also similar to those for Kuwait. For Oman, the null of the unit root is rejected at the 5 percent significance level on the basis of both tests when using the US dollar. When using the Japanese yen exchange rate, both tests are unable to reject the same hypothesis. For Qatar, the presence of a unit root in the real interest rate differential is rejected by both tests when using both exchange rates.

The country-specific individual unit root tests may not be powerful enough to capture international financial market interactions. To address this weakness, we use a variety of panel unit root tests in our estimations, listed in Table 2. It is evident from the table that the LLC and Breitung t-test are unable to reject the null of the unit root in the panel. All the other tests strongly reject the presence of a unit root in the real interest rate differential among GCC countries. Comparing the simple unit root test results and panel unit root test results, we observe that the panel estimates better support the evidence for RIP relative to the country-specific simple ADF or ADF-GLS tests. This result is in line with other panel unit root studies, which have found stronger links among series using panel unit root tests than when using simple unit root tests. The presence of RIP indicates financial market integration in the GCC economies in addition to evidence of goods and services market integration. This finding is consistent with Espinoza, *et al.* (2010) who found strong financial integration among the GCC countries. Our results indicate that, generally, investors in these economies are risk-neutral and that transaction costs are not very high. Furthermore, there are sufficient investors with enough funds for arbitrage in these markets.

Table 2

Panel Unit Root Test Results

Unit Root Test	Individual Intercept	Individual Trend and Intercept
Levin, Lin and Chu *t*-test	–0.4037	0.6886
Breitung t-statistic		2.068
Im, Pesaran and Shin W-test	–3.8006**	–3.1814**
ADF-Fisher Chi Square	34.2209**	26.4975**
PP-Fisher Chi-square	24.7154*	19.36**

* and ** indicates rejection of null-hypothesis of non-stationarity at 5 percent and 1 percent level of significance except Hadri-test, which assumes a null hypothesis of the absence of a unit root. Results are on the basis of US dollar only.

6. CONCLUSION

This study has tested for the presence of a unit root in the real interest rate differential between the GCC countries and the US and Japan. For this, two types of tests were employed: univariate unit root tests and panel unit root tests. In panel unit root testing, we used a variety of tests, and our results showed that panel tests are relatively more successful in finding evidence for RIP than simple country-specific unit root tests. Generally, we can conclude that RIP exists among the GCC countries and that their financial markets are well integrated.

This conclusion supports previous studies that have found evidence of integration in the GCC markets. Examining the feasibility of a GCC monetary union by analysing the integration of markets in these economies can be attributed to the optimum currency area literature, which is known for its weaknesses. Another significant approach to analysing this issue would be to examine the political economy criteria for monetary integration. In this approach, the symmetry of influence among member countries, regional leadership, linkage politics, and regional community identity play an important role at the international level, and the distributional effects of monetary union and economic institutions at the domestic level are key factors in the formation of a monetary union. The GCC countries are major world oil producers and the formation of a monetary union among them is especially important, given the possibility that oil prices quoted in a union's common currency could have enormous and far-reaching benefits for its member countries.

APPENDIX

INTEREST RATE DEFINITIONS

Money market rate for Kuwait is defined as interbank deposit rate for 3 months.
Money market rate for Bahrain is defined as interbank deposit rate.
Deposit rate for Qatar is demand deposit rate. Saudi Arabian deposit rate is taken from IFS line 45660L..ZF...

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