The Banking Sector Key Performance Indicators and International Integration:

A Case of Pakistan

A Dissertation is submitted to the Pakistan Institute of Development Economics for the partial fulfillment of the requirement of the degree of Master of Philosophy in Economics and Finance

By

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CERTIFICATE

This is to certify that this thesis entitled **"The Banking Sector Key Performance Indicators and International Integration: A Case of Pakistan"** submitted by **Syed Ali Abbas Shah** is accepted in its present form by the Department of Economics and Finance, Pakistan Institute of Development Economics (PIDE) Islamabad as satisfying the requirements for partial fulfillment of the Degree of Master of Philosophy in Economics and Finance.

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بسم الله الرحمن الرحيم

Dedication

The humble effort is dedicated to my parents, wife and supervisor

For their loving wishes, support, patience, understanding and Guidance.

Acknowledgment

I would like to express my deepest gratitude to Almighty Allah, the most gracious and merciful, who made me able to accomplish this dissertation. I would like to express my great appreciation to Dr. Hasan Muhammad Mohsin, the most supportive and encouraging supervisor I could have imagined. His guidance, thoughtfulness, and soft nature are unparalleled. I am thankful to him for his useful suggestions and comments on my work, for the quality time he given to my thesis and for his patience over my curious nature over the whole research period.

Syed Ali Abbas Shah

ACRONYMS

IMF   International Monetary Fund

RIPH   Real Interest Parity Hypothesis

RID   Real Interest Differentials

KPI   Key Performance Indicators

ADF   Augmented Dickey fuller test

DF-GLS ERS   Dickey fuller – Generalized least square Elliott, Rothenberg and Stock

KPSS   Kwiatkowski–Phillips–Schmidt–Shin

NPL   Non-performing loans

SBP   State bank of Pakistan

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Abstract

In this study it is tried to elicit banking sector performance according to Key Performance Indicators (KPI) provided by International Monetary Fund (IMF) on one side, and integration of Pakistan with its ten largest trading partners under real interest parity hypothesis (RIPH) framework through unit root test on the other side. Secondary data of ten years is taken for banking sector from 2005 to 2015 and for RIPH analysis short term interest rate data is used from January, 1990 to December, 2014. Descriptive analysis indicates that banking sector in Pakistan is performing according to the KPI's, set by IMF. To analyze the RIPH for Pakistan, five unit root tests of different powers are used on Real Interest Differential (RID) series, which include Augmented Dickey Fuller (ADF), Dickey fuller – Generalized Least Square Elliott, Rothenberg and Stock (DF GLS-ERS), Kwiatkowski–Phillips–Schmidt–Shin (KPSS), Zivot Andrews test for structural breaks and Beaulieu and Miron Monthly unit root test. Results of four out of five tests shown mean reverting behavior of RID series but not the Beaulieu and Miron.

JEL Classification Codes: E44, G21, F15, E43, C120

Keywords: International Monetary Fund, Key Performance Indicators, banking sector, Integration, real interest parity hypothesis, Real Interest Differential, ADF, DF GLS-ERS, KPSS, Zivot Andrews, Beaulieu and Miron

CHAPTER-1

Introduction:

Through this topic we will discuss the performance of Pakistan's banking sector and international integration. Firstly' in global economy financial system of a country is the representative of its growth, which was usually led by Banks (other institutions also perform their role but we are taking banking sector as a basic and key institution).

The intermediary role of banks between borrowers and lenders (depositors) show their importance in financial system. International Monetary Fund (IMF) introduced some key performance indicators (KPI) or financial soundness indicators for banking sector to check the stability of banks after the financial crises of 2007.

Here we will take the KPI's (***Bank Regulatory Capital to Risk-Weighted Assets, Regulatory tier I capital to risk-weighted assets, Bank Capital to Assets, Bank Nonperforming Loans to Total Loans, Bank Return on Assets, Bank Return on Equity , Interest margin to gross income, Noninterest expenses to gross income, Liquid assets to total assets (liquid asset ratio), Liquid assets to short-term liabilities and Net open position in foreign exchange to capital***)[1] for Pakistan's banking sector to see that either Pakistan's banking sector is performing well or not, further we compare the performance with major trading partners and developed economies.

According to State Bank of Pakistan (SBP) report January 2015, 55 banks are performing in Pakistan. Out of 55 banks 5 are Public sector banks, 2 specialized banks, 17 private sector banks, 7 foreign banks operating in Pakistan, 5 Islamic banks, 8 development finance institutions and 10 Microfinance banks.

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[1] Data source: IMF & selected countries central banks.

KPI's are used to avoid the situations or issues like 2007 financial crises of USA and Europe region because day by day financial sector is becoming more complicated as compare to earlier stages where only borrowing and lending occurs (now banks are performing their role in trade, stock exchanges, controlling money supply as a tool for central banks) we cannot neglect the role of banking sector in financial sector because of its role for economic performance and growth is not neglect able.

In present era banks not only performing their role for borrowing and lending purposes only but they play a better role in the development of the economy.
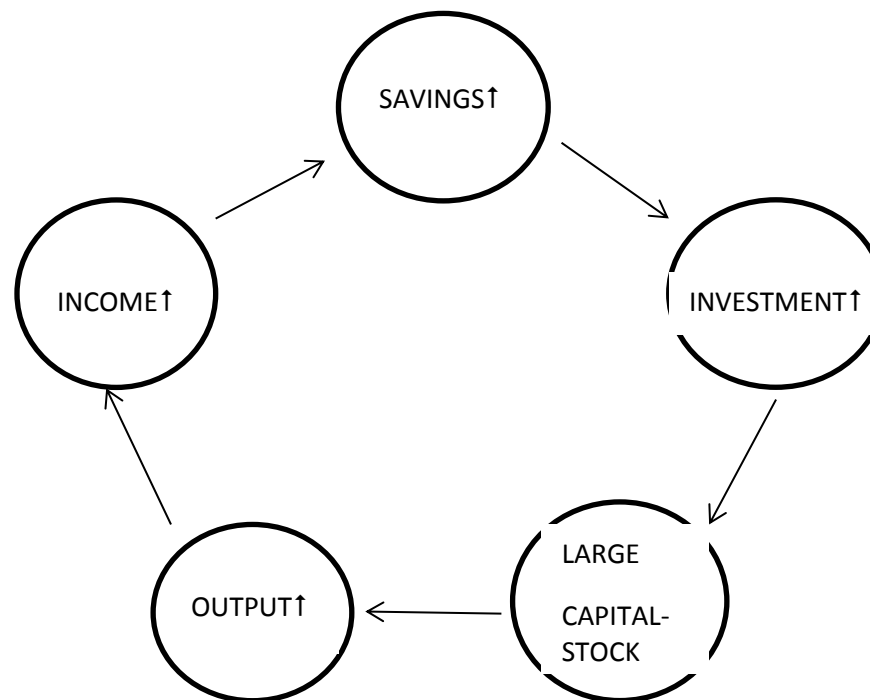
Harrod-Domar Growth Model

Well-functioning banks spur technological innovation by identifying and funding those entrepreneurs with the best chances of successfully implementing innovative products and production processes.[2]

Secondly we will estimate the real interest parity hypothesis (RIPH) for Pakistan with its Ten largest trading partners *China mainland, USA, Japan, India, Malaysia, Germany, Indonesia, Singapore, Spain and United Kingdom[3]* (Saudi Arabia, United Arab Emirates and Kuwait are excluded due to the unavailability of data).

Money market rate used for "Singapore", Deposit rates are used for "China mainland", Discount rate for "Pakistan, USA, United Kingdom, India and Japan", Treasury bill 3-month rate for "Malaysia" and call money rate for "Germany, Spain and Indonesia".

In the era of globalization countries developed closer links with each other's, so investors try to diversify their risk by abroad investments for which RIPH plays an important role through which we check the financial integration between mentioned countries.

According to the previous literature RIPH hold better in the case of countries following IMF framework (Sarmidi, T & Caglayan, M. (2010)).now here we will check that what will be the RIPH status in case of Pakistan. According to State Bank 2015 report China(China-Pak corridor) and USA(USAID and largest allies against terrorism) are the largest trade partners of Pakistan so it was another opportunity to find out that which country hold better RIPH for Pakistan.

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[2] Joseph Schumpeter (1912)
[3] Data source: State Bank of Pakistan Economics data.

RIPH means that if an agent do forecast by using rational expectations and arbitrage forces are acting freely in assets and goods market than the real interest rate between countries will be equalize. RIPH is a test of market integration because it is based on frictionless market.

According to Moosa and Bhatti[4] RIPH requires following assumptions, the validity of covered interest rate parity (efficiency of domestic and foreign capital markets), Purchasing power parity (efficiency of commodity and financial markets) and the unbiased-ness of forward rate as a forecaster of future spot rate.

Whether the hypothesis hold or not it's a different economic matter but the validation of real interest rate equalization among countries is the evidence of capital mobility and financial integration.

If the RIPH is valid then the effectiveness of central bank to use the real interest rate and affect the real economy will be restricted, because the convergence of RIPH or its extreme case will alarm the monetary authorities that how to use the monetary policy effectively. In the case of open economy the necessary pre-condition for monetary policy transmission mechanism to function successfully is to allow real rates to differ across countries by controlling nominal rates.

According to some formal empirical literature like (Goodwin and Grennes, 1994) financial integration remain incomplete due to some non-traded goods or transaction costs.

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[4] Some evidence on mean reversion in ex ante real interest rates (1996).

CHAPTER-2

Review of literature:

Through this paper we test the real interest parity hypothesis by the taking Pakistan as the reference country for its ten largest trade partners according to 2015 report of Pakistan Central bank. Further the evidence will be provided on the base of results for Integration among countries respected to Pakistan.

It's a first time when Pakistan is selected as a base country rather than as a repressor one and the major finding will help us in the case of two major trade partners China and USA[5] because these two countries show major influence in polices (Trade Polices) of Pakistan and also in investment (according to latest economic data by central bank of Pakistan china is the major exporter to Pakistan due to which our production and Agriculture sectors cannot compete with the Chinese sector and due to high competition Pakistani sectors are not growing well as they have to be e.g. In agriculture cotton is imported from china and in industrial major home appliances are china made. Now the China Pakistan economic corridor "CPEC" affects the investment which is coming through the banks because banks play the role of intermediaries)

Aurangzeb (2012) worked on the contribution of banking sector in economic growth of Pakistan from 1981 to 2010 through selecting 10 performing banks. Researcher estimated granger-causality test by through the bank's advances, deposits and profitability and confirmed the bidirectional relationship with economic growth. On the other hand unidirectional relationship of investment and interest earnings with economic growth found.

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[5] State bank of Pakistan economics data

Hussain et al (2015) took economic growth as dependent variable and bank credit to private sector, interest rate, inflation, investment to GDP and government consumption were taken as independent variables from 1973 to 2013. Co-integration VECUM and granger-causality test used to check the relationship and causality effect of the variable. Results showed that bank credit had extensive relationship with economic progression and significant effect in short run but adverse effect of bank credit on economic growth in Pakistan. The reason of adverse effect is the Pakistan central bank restrictions on the percentage of credit given to the entrepreneurs.

Camarero et al. (2004) tested the RIPH (real interest parity hypothesis) among 6 major OECD (organization for economic co-operation and economic development) countries by using quarterly based data from 1958Q1 to 2003Q3. Tests include univariate and multivariate ADF (augmented Dickey Fuller) tests by using SURE (seemingly unrelated regression equations) method. For Lag selection MAIC (modified Akaike Information Criteria) is used. Short term domestic money market rates are used for analysis because they reflect market forces better than deposit rates and treasury bill rates are used when available otherwise call money rates. CPI (consumer price index) is used for price level. RIP is measured against ex-ante and ex-post sense. Result shows that RIP hold in all cases studied either in strong or weak version.

Ferreira et al. (2007) used unit root test to estimate the RIPH (real interest parity hypothesis) for developed and emerging markets. Test period is selected from 1995 to 2002 because most of the countries did their markets liberalized after 1990s and short term Treasury bill rates are used to avoid the influence of risk premium and forecast errors in the composition of RIDs. Findings show that developed and emerging markets show different behavior and some of the important monetary announcement by countries are not reflected in the structural breaks during sample period. Paper estimates are in the support of markets integration and existence of long run mean

in the RIDs of emerging markets higher than for developed ones so there is an existence of large risk premium for emerging markets.

Furkan et al. (2015) investigated the validity of real interest parity hypothesis by using panel unit root test for G-7 and nine post-soviet transition economies and taking USA as a base country. First authors find the non-linear behavior of the series by using STAR (smooth transition autoregressive), TAR (Threshold Autoregressive) and PTAR (panel threshold autoregressive). Model and then sieve bootstrap methodology was used to tackle the problem of cross sectional dependence in panel. Data of Treasury bill rates, Deposit rates and Money market rates are used from 1979Q1 to 2011Q2 for G-7 countries and 1990M1 to 2010M7 for post-soviet transition countries. The unit root tests include ADF (Augmented Dickey Fuller), IPS (Im, Pesaran and Shin) and KSS (Kapetanios, Shin and Shell). Findings of the paper show that PTAR give better results and all G-7 and post-soviet transition countries show integration expect one post-soviet transition country (Armenia) due its policies.

Liew and Ling. (2008) examined the real interest parity hypothesis by taking China as counterpart for 10 East Asian economies. By applying two unit root tests for comparison purpose ADF (conventional univariate Augmented Dickey Fuller) and its improved version ADF-GLS (Generalized Least Square Augmented Dickey Fuller) and three types of interest rate (Deposit rates, Money market rates and Treasury bill rates) data is selected according to the availability from 1987Q1 to 2006Q2. According to paper finding result of ADF-GLS are more robust than ADF and stronger integration exist for most of the countries with China. Half-life of RIP is also calculates to check the speed of convergence which is 3.21 quarters (9.6 months).

Meese et al. (1988) explored the relationship between real exchange rate and real interest differentials for four developed countries by using monthly data of Bond rate and exchange rate from Feb 1974 to March 1986. According to author if unanticipated money demand occurs so it will affect the both variables proportionately. Test results are based on the D-F (Dornbusch and Frankel model), H-M (Hooper and Morton model) and GMM (Generalized method of Moments) technique. Predictions of the model shows that real interest rate differentials are highly correlated with real exchange rate movements and the results obtained through serial correlation coefficients are better than using first difference. For integration test rests show that real interest differentials appeared to be non-stationary which means that the capital markets are highly integrated.

Mohsin et al. (2011) did panel data analysis for five south Asian countries to find financial market integration. Financial integration was estimated by applying two econometric techniques (saving investment relation and real interest rate differentials). CPI and quarterly data of Treasury bill, call money rates, deposit rates and bank rates are used for countries according to their availability from 1980 to 2008. Tests include IPS (IM, Pesaran, and Shin), LLC (Levin, Lin and Chu) and Hadri unit root. For capturing the effects of liberalization or openness polices dummy variables were incorporated by author. Most of the countries in South Asia are liberalized after 1990s so dummy "1" is used after 1993 and "0" otherwise. Paper findings show that the overall intercept and intercept dummy after 1993 are insignificant which means that after 1993 integration among countries was increased.

Obstfeld et al. (2002) used the data of three countries and USA as a base country to check real interest rate convergence by using 7-year maturity Bond yield data and for inflation ex-post 12-month forward rate of change of consumer price index from over than century (1880 to 2000).

To avoid noisy data from non-market periods like War periods, Gold standard, Bretton Wood period etc. are exempted. Two stationary tests are applied to check the convergence ADF (Augmented Dickey Fuller Test) and DF-GLS test. Results show that where the null is rejected at 1 percent real interest rate differential have no unit root in the long run but the flow from 1986 to 2000 show convergence.

SARMIDI et al. (2010) found structural breaks and real interest parity hypothesis for Thailand and Malaysia by taking USA as a base country. After Asian financial crises in 1997 Thailand (IMF program) and Malaysian (selective capital controlled policies) governments adopt different polices. Author's selected data from 1990 to 2000 of monthly inter-bank money rate and apply ADF (Augmented Dickey Fuller) and KPSS (Kwiatkowski–Phillips–Schmidt–Shin) unit root tests. Findings of the paper show that due to adoption of different policies Malaysia hasn't show integration but in the case of Thailand integration is seen due to different policies.

Shi et al. (2012) performed four different types of unit root tests (ADF, PP, KPSS and DF-GLS) on six developed countries and checked real interest parity hypothesis. In the paper they compared the results of mentioned unit root test and discussed their flaws and strength on the base of estimates and previous literature. Quarterly data of CPI and Interest rate (3-months Treasury bill and 3-month deposit rate) are used from 1980Q2 to 2009Q1 for 6 countries and United States is selected as a benchmark. Short term maturity rates are selected on the base of liquidity premium theory. Findings of the paper are that ADF and PP are weak when deal with small sample size on the other hand KPSS and DF-GLS result support the mean reverting process and RIPH hold for most of the countries.

Singh et al. (2006) applied panel unit root proposed by pesaran "CADF(cross-sectional Augmented Dickey Fuller)" (To capture the improved macroeconomic fundamentals since earl 1990s) and checked the long run real interest convergence in the emerging markets and speed of convergence in the present of shocks. For test 14 emerging economies was selected and their money market interest rate and CPI (for inflation) data ranges from 1991Q1 to 2005Q4. Results suggest that there is a little evidence of long run convergence of short term interest rates in Emerging Economies but in some emerging markets shocks play a vital role and long term interval occur in real interest rate differential to converge back to their ex-ante level. Another major finding of the paper is that the countries with lower real interest rate have slow mean reversion to their trend rate as compare to the countries with higher real interest rates.

Zubaidi et.al (2005) checked the RIPH for East Asian countries by applying panel unit root test due to the low power of ADF in measuring the mean reverting behavior of Rid Series. They applied the test on pre and post liberalization data by dividing data in two parts from 1977-q1 to 2001-q1 by taking Japan as base country. From 1977 to 1984 they used as pre and 1985 to 2001 as post liberalization era. Their results suggest that rip hold for japan and emerging Asian markets. They also calculated the half-life of series and suggest that deviation from Rip is around 6-7 months.

Edison and Pauls (1991) paper provided the base for the construction of RIPH. The basic question they discussed is the relationship between real interest differentials and real exchange rate. They applied Enger granger approach and through error correction model they give a reason to believe about the week relationship of RID and real exchange rate.

Evidence on 5 European monetary system (EMS) markets and 5 non-European markets is presented by Alexakis.et.al (1997) in their paper. They selected the data range from 1882-m1 to 1993-m12. The result of integration is stronger in the case of EMS markets due to lower exchange rate volatility relative to Non-EMS markets. Same as in long run results revealed the presence of systematic real interest rate relationship.

Cooray & Felmingham (2008) measured the real interest rate interdependence among G7 countries through 3-months T-bill rate from 1970-1 to 2003-12. Results are in the acceptance of high degree of interdependence between G7 countries interest rates and the integration is increasing over the sample period. Oil price shock effect is highlighted but September-11 and Asian financial crises have limited effect. The reason of high integration between G7 countries is due to high mobility of capital.

Rehman.S and Shah.A discussed the linkages between Real exchange rate and Real interest rate differentials through monthly data of Pakistan from 1991-7 to 2009-6 by applying co-integration approach and they didn't find consideration among variables. The reason for results is the continuous fluctuations in the exchange rate, instable monetary policy, poor GDP growth and lack of proper policies and political instability.

Chung et.al discusses the non-equalization of interest rate globally by taking monthly data of deposit rates for G-5 countries form 1960-2 to 1996-4 and applied multivariate unit root tests. According to results Fisher condition is least likely to violate the equilibrium of RIP but uncovered interest rate parity appears most commonly violated.

Chin.D and Frankel.A (1995) focused on the two major countries USA and Japan and investigated interest parity hypothesis. The influence of USA and Japan interest rate is checked by selecting countries around Pacific Rim, through 3-months interbank rate from 1982-Q3 to

1992-Q1[6]. The results are in the rights of Integration existence among selected countries and some countries interest rates are influenced by USA rates and some by Japan rates.

Yilanci.V and Bozoklu.S analyze the hypothesis for 16 emerging economies by using Japan and USA as base countries. Pool data range is selected from 1990-M1 to 2009-M12 which varies for different countries between the selected range. Results provide evidence on the existence of hypothesis for all countries. The hypothesis is tested with linear and non-linear both kind of test to provide better results in the evidence of Integration.

Fountas.S and WU.L (2000) tested the weak and stronger form of Real Interest Parity for G7 countries using USA as a base country. Results differ with the type of tests applied but there is an evidence of USA dominant role in affecting the monetary policy in other selected countries. The results are the outcome of structural break test and Enger-Granger co-integration tests.

Arghyron et al. discussed the convergence of real interest rate for Europe Monetary Union Economies by two steps. In first step the checked the RID series with structural break tests and then check the convergence of series. Data range is selected from 1996-M1 to 2005-M12 and the convergence is rejected for only three countries.

Ling et al. (2006) found the convergence of interest rate between two small and open economies Singapore and Malaysia. Due to integration between selected countries two major recommendations are given by authors. First investors have to look for diversification due to occurrence of contagion effect because of strong trade and finance relationship between these two countries. Second monetary and fiscal authorities of both countries should work in hand to hand to avoid potential macroeconomic instability in the region.

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[6] Q means quarter or one fourth of year

Jaun.C and Barry.H (2009) done the pool analysis of RIPH[7] for Central and East European Countries by taking data range 1994-M1 to 2007-M12. Ng and Perron (2001) and KSS unit root tests is applied on the RID series by taking USA and some European countries as reference. In general they find stronger evidence of RIPH when the possibility of asymmetries in the speed of mean reversion is accounted for.

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[7] RIPH stands for Real Interest Parity Hypothesis

CHAPTER-3

Objectives and hypothesis of study:

The study is conducted for the evaluation of Pakistan banking sector performance regarding Financial Soundness or Key Performing indicators[8] by IMF and there measurement according to BASEL Accord-3[9]. Second part of the study is regarding Integration of Pakistan with its largest trading partners (in the context of Real Interest Parity Hypothesis), which was discussed through conducting unit root tests of different powers.

The study has two main objectives:

First Objective of the study is to check performance of banks operating in Pakistan[10]. The comparative performance (with trading partners) shall be measured through the KPI's given by IMF after the financial crises.

Hypothesis for first objective is:[11]

H_0: Pakistani banks are performing according to KPI's by IMF.

H_1: Pakistani banks are not performing according to KPI's by IMF.

Second objective of the study is to check RIPH (integration) for Pakistan with its 10 largest trading partners on the base of short term interest Rates[12].

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[8] Only banking sector indicators are selected because we are dealing with banking sector only instead of depository sector or financial sector whole

[9] International regulatory framework for banks

[10] Included all types of Banks given by state bank of Pakistan

[11] CONTRIBUTIONS OF BANKING SECTOR IN ECONOMIC GROWTH: A Case of Pakistan

[12] Types of interest rates may be differ but all are short term.

Hypothesis for second objective is :[13]

H$_0$: RIPH holds for Pakistan with its largest trading partners.

H$_1$: RIPH does not hold for Pakistan with its largest trading partners.

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[13] Does the Real Interest Parity Hypothesis Hold? Evidence for Developed and Emerging Markets

Methodology:

For first objective of the study we will do descriptive analysis on the base of Key performance indicators graphs.

For second objective we will generate RID series and apply unit root tests for checking mean reverting behavior of series under RIPH framework.

The RIPH model can be derived with help of UIP (uncovered interest rate parity) and PPP (purchasing power parity) conditions because if the both conditions hold than we gave it the name of Real interest rate parity.
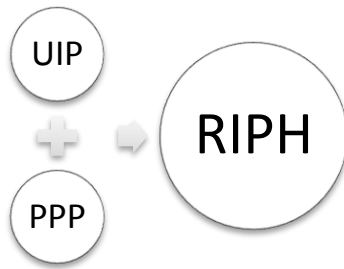
The Uncovered interest rate parity (UIP) condition is:

The uncovered interest rate parity (UIP) is a parity condition stating that the difference in interest rates between two countries is equal to the expected change in exchange rates between the countries' currencies.

The Purchasing power parity (PPP) condition is:

Purchasing power parity (PPP) is a theory which states that exchange rates between currencies are in equilibrium when their purchasing power is the same in each of the two countries

$$i_t - i_t^* = ds_t^e \tag{1}$$

In equation-1 i_t is the domestic interest rate at time t and i_t^* is the foreign interest rate at time t on the other side of equation s_t represents the exchange rate which is the domestic price of foreign currency and the superscript e means expected. So the whole term ds_t^e is the expected rate of depreciation of exchange rate, which is $ds_t^e = \frac{s_t^e}{s_{t-1}} - 1$, and d is the first difference of logarithm.

$$ds_t = \pi_t - \pi_t^* \qquad (2)$$

In equation-2 π_t represents the inflation in domestic country at time t and π_t^* represents the inflation in foreign country at time t.

$$ds_t^e = d_{st} + \varepsilon_t \qquad (3)$$

Here ε_t represents the error term that exhibits with classical properties: iid N $(0, \sigma_\varepsilon^2)$, the term σ_ε^2 represents its variance.

Now, if PPP (purchasing power parity) holds than we can substitute equation-2 into equation-3 and further the results into equation-1.

$$ds_t^e = \pi_t - \pi_t^* + \varepsilon_t \qquad (4)$$

Now if we put it equation-4 in equation-1 we will get equation 5

$$i_t - i_t^* = \pi_t - \pi_t^* + \varepsilon_t \qquad (5)$$

$i_t - i_t^*$ = represents the interest rate difference between domestic (Pakistan) and foreign country.

$\pi_t - \pi_t^*$ = represents the inflation difference between domestic (Pakistan) and foreign country.

So we can write equation-5 as

$$(i_t - \pi_t) - (i_t^* - \pi_t^*) = \varepsilon_t \rightarrow rid_t \qquad (6)$$

$(i_t - \pi_t)$ = represents the real inflation in domestic (Pakistan) country.

$(i_t^* - \pi_t^*)$ = represents the real inflation in foreign country.

$rid_t{}^{14}$ = represents the real interest rate difference between domestic (Pakistan) and foreign country at time t.

Since ε_t are iid N $(0, \sigma_\varepsilon^2)$, so the expected value of RID is zero.

Now consider rid_t follows a general stochastic process.

Here the main hypothesis is to test the stationarity of the RIDs series by applying unit root tests. The stationary of the RID series will tell us about the convergence of RID series and the evidence of integration between Pakistan and selected countries.

$$rid_t = \beta_0 + \beta_1 rid_{t-1} + \varepsilon_t \qquad (7)$$

Equation-7 represents the first order Auto Regressive process and can be tested through unit root hypothesis. We can represent equation-7 as P^{th} order auto regressive process.

$$\Delta RID_t = \alpha_0 + \theta_1 RID_{t-1} + \sum_{i=2}^{\rho} \beta_i RID_{t-i+1} + \varepsilon_t \qquad (8)$$

Where $\theta = \sum_{i=1}^{q} \beta_i - 1$

So what are the possibilities of the size and sign of the θ, according to Ferreira et al. (2003) there are four possibilities.

$$\theta > 0 \qquad (a)$$

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[14] RID means real interest rate differentials

$\theta = 0$ (b)

$\theta < 0$ and $\beta_0 = 0$ (c)

$\theta < 0$ and $\beta_0 \neq 0$ (d)

If inequality condition (a) fulfills than it means that the value of θ is greater than 0 and the series will not converge to any mean in long-run because the path of RIDs in this case is explosive.

The equality condition (b) means that RIDs series contain unit root and follows a random walk process with shock affecting the variable on permanent basis.

Condition (c) says that RIDs series follow a stationary process and converge to the zero mean. In other words the RIPH condition hold and the speed of adjustment of the RIDs to its equilibrium level is measure of the degree of persistence.

The last condition (d) represents that the RIDs series converge to mean that is different from zero.

Data:

Yearly data is selected for banking sector performance (included both scheduled and non-scheduled banks) for Pakistan and selected trading partners (2005-2015)[15].

For RIPH (real interest parity hypothesis) we will use monthly CPI (consumer price index)[16] data to find inflation and for interest rate data we use different type of interest rates (short term interest rates) from 1990-M1 to 2014-M12 as used by previous researchers to find RIP. The reason of selecting period after 1990s is because Pakistan adopted liberalization policies after 1990s.

[15] Data source: IMF
[16] Data source : World Bank

CHAPTER-4

Unit Root Tests:

We will apply time series unit root test to check the stationarity and convergence of RIDs series to mean. Tests include:

- *ADF (Augmented Dickey Fuller test)*

- *DF-GLS ERS test*

- *KPSS (Kwiatkowski–Phillips–Schmidt–Shin test)*

- *Beaulieu and Miron (Monthly unit root test)*

- *Zivot-Andrews test (1992) with structural breaks*

Following are the unit root tests used in previous studies like Ferreira et al. (2003) and etc. which we will apply on RIDs series.

- **Augmented Dickey Fuller Test**

The test is extended version of Dickey Fuller test by Dickey and Fuller, ADF test include extra lagged terms of the dependent variable to eliminate or avoid the problem of autocorrelation. The lagged length for ADF test is selected through Akaike information criterion (AIC) or the Schwartz Bayesian criterion (SBC).

The simple Dickey Fuller test starts from AR (1) model:

$$Y_t = \emptyset Y_{t-1} + \mu_t$$

Now if we subtract Y_{t-1} from both sides, so we will get:

$$Y_t - Y_{t-1} = (\emptyset - 1) Y_{t-1} + \mu_t$$

$$\Delta Y_t = (\emptyset - 1) Y_{t-1} + \mu_t$$

$$\Delta Y_t = \gamma Y_{t-1} + \mu_t$$

Here $\gamma = (\emptyset - 1)$

Now after adding trend to the DF equation, we will get:

$$\Delta Y_t = a_0 + \gamma Y_{t-1} + \mu_t$$

Further by allowing non-stochastic time trend the equation will be:

$$\Delta Y_t = a_0 + a_2 t + \gamma Y_{t-1} + \mu_t$$

Now to make it Augmented Dickey Fuller (ADF) test we will allow extra lagged terms of dependent variable according to the Dickey and Fuller.

$$\Delta Y_t = a_0 + a_2 t + \gamma Y_{t-1} + \sum_{i=1}^{p} \beta_i \, \Delta Y_{t-1} + \mu_t$$

Now for Money Market Interest Rate the ADF unit root test equation will be:

$$\Delta I_t^d = a_0 + a_2 t + \gamma I_{t-1}^d + \sum_{i=1}^{p} \beta_i \, \Delta I_{t-1}^d + \mu_t$$

Here I^d represents the real money market interest rate difference between base and other country. We will use all three presented cases of ADF test.

$H_0 = \gamma = 0$ (series I^d is stationary)

$H_1 = \gamma < 0$ (series I^d is non-stationary)

- **Dickey Fuller GLS (ERS) test**

1n 1996 Elliot, Rothenberg and Scot (ERS) proposed most efficient test as compared to Augmented Dickey Fuller test by modifying the Dickey Fuller test statistic using a generalized least square (GLS) rationale. According to them when unknown mean or trend is present in data than is good to use this test. There are two forms of the DF GLS (ERS), one is DF GLS de-trending and other is DF GLS de-meaning. With DF GLS de-trending the series is regressed on constant and linear trend to test, on the other hand with DF GLS de-meaning only a constant appear at the first stage of regression and then the residual series are regressed in dickey fuller regression.

The test will determine either a time series variable or data is non-stationary using an auto regressive model. The unit root is created by ERS for the series featuring deterministic components in the form of a constant or a linear trend, that's why this test dominates ADF in terms of power.

By de-trending the data the explanatory variable is taken out and then run the regression. The null is tested against a quasi-difference of that depends on the value representing the specific point alternative defined by ERS.

$$d(y_t|\alpha) = \begin{cases} y_t, & if\ t = 1 \\ y_{t-ay_{t-1}}, & if\ t < 1 \end{cases}$$

$$d(x_t|\alpha) = \begin{cases} x_t, & if\ t = 1 \\ x_{t-ax_{t-1}}, & if\ t < 1 \end{cases}$$

Now consider an OLS regression of the quasi differenced data

$d(y_t|\alpha)$ On the quasi differenced $d(x_t|\alpha)$

$$d(y_t|\alpha) = d(x_t|\alpha)'\delta(\alpha) + \mu_t$$

Where x_t contains a constant or constant and trend

Let $\hat{\delta}(a)$ be the OLS estimate from the regression.

Know we need to know is the value of α and for that ERS recommend to use the value of $\bar{\alpha}$.

$$\bar{\alpha} = \begin{cases} 1 - \dfrac{7}{T}, & if \ x_t = 1 \\ 1 - \dfrac{13.5}{T}, & if \ x_t = (1,t)' \end{cases}$$

After that define the GLS de-trended data y_t^d by using the estimates associated with the $\bar{a}$

$$y_t^d = y_t - x'_t\hat{\delta}(\bar{a})$$

Now DFGLS involves estimating the standard ADF test equation after substituting the GLS de-trended y_t^d for the original y_t

$$\Delta y_t^d = \alpha y_{t-1}^d + \sum_{j=1}^{p} \beta_j \Delta y_{t-j}^d + v_t$$

- **Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test**

KPSS (1992) is used to test the null hypothesis of stationarity against alternative of non-stationarity.

Hypothesis:

H_0: y_t is trend stationary OR $\sigma_\mu^2 = 0$

H_1: y_t is non $-$ stationary

KPSS allows testing two types of stationarity

1- Series is trend stationary

2- Series is stationary with level (constant term)

KPSS Equation:

$$Y_t = \beta_t + r_t + \varepsilon_t$$

β_t = deterministic part or trend point.

r_t = random walk part of series.

$r_t = r_{t-1} + \mu_t$

The initial value of r_t is $r_0 = a$ serves as an intercept.

ε_t = iid (independently identically distributed ($0, \sigma_\mu^2$) error term.

t = time index

If

$$r_t = r_{t-1} + \mu_t$$

$$\mu_t \sim \text{iid } (0,\sigma_\mu^2) \qquad\qquad\qquad\qquad \text{so the E } (\mu_i, \mu_j) = 0 \quad i \neq j$$

So here we have $\qquad r_{t-1} = y_{t-1}$

The model will be equivalent to

$$Y_t = \beta_t + y_{t-1} + \mu_t$$

Here Y_t is a random walk series

TREND STATIONARITY:

If $r_t = r_0$ then model is

$$Y_t = r_0 + \beta_t + \varepsilon_t$$

Now the series Y_t is trend stationary.

KPSS test for the series is trend stationary is:

H_0: y_t is trend stationary

$$r_t = r_0 \text{ OR } \sigma_\mu^2 = 0$$

H_1: y_t is non $-$ stationary

y_t Follows random walk process

$$Y_t = \beta_t + y_{t-1} + \mu_t \ \ \text{OR} \ \ \sigma_\mu^2 \neq 0$$

LEVEL STATIONARITY:

H_0: y_t *series is level stationary*

$$r_t = r_0 \ \text{OR} \ \sigma_\mu^2 = 0$$

H_1: y_t *series is non − stationary*

y_t Follows random walk process

$$Y_t = \beta_t + y_{t-1} + \mu_t \ \ \text{OR} \ \ \sigma_\mu^2 \neq 0$$

MODEL FOR RESEARCH:

Now the our KPSS model for testing the series of interest rate difference for RIPH will be

$$I_t^d = \beta_t + I_{t-1}^d + \mu_t$$

Here I^d represent the real money market interest rate difference between base and other country.

The hypothesis will be

H_0: I^d *series is trend or level stationary*

$$r_t = r_0 \ \text{OR} \ \sigma_\mu^2 = 0$$

H_1: I^d *series is non − stationary*

I^d Follows random walk process

$$I_t^d = \beta_t + I_{t-1}^d + \mu_t \quad \text{OR} \quad \sigma_\mu^2 \neq 0$$

- **Beaulieu and Miron monthly unit root test:**

Fransses (1991) extended the Hegy (1990) procedure of seasonal unit root for quarterly to monthly, according to Fransses there are eight roots in the series but in 1993 Beaulieu and Miron extend the test and take 12 roots, that's why test by Beaulieu and Miron is more efficient for monthly data as compare to Fransses and we will use it to check the real interest parity hypothesis. We will apply the test to the RID series of selected countries and check their mean reverting behavior on the behalf of their stationarity condition.

The test is based on three steps:

At first 12 series are generated as proposed by B&M (1993) and in second step the equation is estimated by simple OLS procedure in which $Y13_t$ is regressed.

$$Y13_t = a_0 + a_1 t + \sum_{k=2}^{12} a_k D_{kt} + \sum_{k=1}^{12} \pi_k \, yk_{t-1} + \varepsilon_t$$

In next step we apply Breusch-Godfrey Serial Correlation LM test to check the existence of serial correlation in the residual term.

The hypothesis for this will be:

H_o: no autocorrelation in the series

H_1: autocorrelation is in the series

If there is serial correlation then we add lagged dependent variables to check further, until the issue is resolved and then we moved to the next step.

In final step we test the hypothesis proposed by B&M (1993).

1) The null about the presence of a unit root at the zero frequency is tested with the "t" statistic of the hypothesis

H_O: $\pi_1=0$ unit root at zero frequency

H_1: $\pi_1<0$

2) The null hypotheses about the existence of seasonal unit roots are tested, in each frequency, by means of the "t" statistic associated with

H_O: $\pi_i=0$

H_1: $\pi_i<0$ for $i=2, 3...12$

3) The joint hypotheses which take into account all pairs of conjugate complex roots are tested by means of the "F" statistic associated with

$H_0: \pi_i = \pi_{i+1} = 0$, for $i = \{3, 5, 7, 9, 11\}$

H_1: at least one of them is not equal to zero

- **Zivot-Andrews Unit Root Test**

Zivot and Andrews introduce this test to test the stationarity of series have structural breaks (1992).

The unit root null hypothesis of Zivot-Andrews test follows the notation of perron three different models to test stationarity of time series with structural break. These three equations take in account three kinds of structural breaks to test stationarity of series.

Equation-1 is a Crash Model as named by perron; this model allows the break in the level or intercept of the series.

$$I_t^d = \hat{u}^A + \widehat{\emptyset}^A DU_t(\hat{\lambda}) + \hat{\beta}^A t + \hat{a}^A I_{t-1}^d + \sum_{j=1}^{k} \hat{c}_j^A \Delta I_{t-j}^d + \hat{\varepsilon}_t$$

Equation-2 is known as changing Growth Model, this model allows for the break in the slope of the series.

$$I_t^d = \hat{u}^B + \hat{\beta}^B t + \hat{\gamma}^B D_t^*(\hat{\lambda}) + \hat{a}^B I_{t-1}^d + \sum_{j=1}^{k} \hat{c}_j^B \Delta I_{t-j}^d + \hat{\varepsilon}_t$$

Equation-3 allows both effects occur simultaneously in the series.

$$I_t^d = \hat{u}^C + \widehat{\emptyset}^C DU_t(\hat{\lambda}) + \hat{\beta}^C t + \hat{\gamma}^C DT_t^*(\hat{\lambda}) + \hat{a}^C I_{t-1}^d + \sum_{j=1}^{k} \hat{c}_j^C \Delta I_{t-j}^d + \hat{\varepsilon}_t$$

Hypothesis for all three models are:

(H₀) *Null hypothesis*

$$I_t^d = \mu + I_{t-1}^d + \varepsilon_t$$

(H₁) *Alternative hypothesis*

$$\underset{\lambda \epsilon \Lambda}{\inf} \, t_{\hat{a}i}(\lambda) < k_{inf,a}^i \qquad\qquad i = \text{A, B, C}$$

$k_{inf,a}^i$ Represents the size of a left tail critical value from the asymptotic distribution of $\underset{\lambda \epsilon \Lambda}{\inf}$ $t_{\hat{a}i}(\lambda)$.

In all three models I_t^d represents the difference series of base and other selected countries real interest rates.

CHAPTER-5

Here in chapter-5 we test the hypothesis of first objective about banking sector performance according to IMF Key performance indicators and do the comparison with largest ten trading partners of Pakistan

Financial soundness indicators (FSI)[17]:

Financial soundness indicators are the basic key tools for measuring the performance of financial system (through banking performance only) of the country though to avoid major losses. The key term becomes more famous after the 2007 financial crises due to the banking sector major role and importance in the crises.

There are new indicators added to the FSI's by International Monetary Fund (IMF) to make the banking sector more soundness to avoid crises. FSI,s can help in forecasting the crises according to their values as Schaeck &cihak[18] discussed by taking data from 1995 to 2004 of 100 countries and few other researchers also worked on that and give some values of few FSI,s as alarm for crises or movement toward crises.

The major problem all authors faced is the data unavailability; because the countries aggregate data of FSI's is not fully compiled or available. All previous papers discussed the results or issues on the available variables.

Following are the major indicators for banking sector by IMF[19]:

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[17] The term FSI or Financial soundness means only banking sector not whole financial system
[18] How Well Do Aggregate Bank Ratios Identify Banking Problems? (IMF paper)
[19] https://www.imf.org/external/np/sta/fsi/eng/fsi.htm

CAPITAL ADEQUACY

- **Regulatory capital to risk weighted assets**

  It is the amount of capital that a bank has to hold according to order of regulatory authority or central bank to the percentage of risk weighted assets.

  $$\frac{Tier\ 1 + Tier\ 2}{Risk\ Weighted\ Assets}$$

  For this part of capital adequacy we have yearly data for Pakistan and its largest 10 trading partners from 2005 to 2015. In Basel 1 accord 1988 the importance of risk-weight approach is cleared by the committee. It will help the banks in three different ways:

  I.   Easily compare the banks against different geographies

  II. Easy to include off-balance sheet items in capital adequacy calculations

  III. Banks will carry low risk liquid assets in their books

  According to data if we look at the selected countries, so we come to know that which country deposit takers have high regulatory capital to risk weighted assets and which country deposit takers have low, it also depend on the country financial conditions.

  According to the (Figure-1) we can see the every country positions in percentage terms with the passage of time to meet the requirements. As we can see that Pakistan deposit taker also show increasing trend as other countries deposit takers because of its importance and increasing business or financial strength of the countries. According to the selected period the important financial event occur in whole world is 2007-08 financial crises but we cannot see its clear impact on the figure of selected countries. Here only China shows highly increasing trend from start to 2008 but after that China series also shows a common behavior.

On the base latest data selected countries ranged between 12-22%, where India at the lowest with 12.7% and Indonesia with highest 21.3%. According to the data, Pakistan position is also seen good and showing a normal behavior.

- **Regulatory tier-1 capital to risk weighted assets**

  According to the Basel accords[20] tier-1 capital is required to measure the banks financial health, it is based on core equity capital to total risk weighted assets. According to Basel accord the minimum requirement of tier-1 in 2015 is 6%. In Figure-2 we can see that Tier-1 series of Pakistan is showing the normal behavior but on the other side Indonesia, Germany, UK and Spain series showing slightly upward trend but Japan and USA series showed normal behavior with slightly upward movement. Tier-1 is showing the behavior of banking sector in stock exchange market. As compare to other countries Pakistan series is also showing improvement with normal behavior. It means that all countries markets giving perception of good about their depository sector. If there is any downward trend of any country than it means that country depository sector is going to face losses due to increase in risk weighted assets.

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[20] Committee on bank supervision based on Basel, 1, 2 & 3. Founded in 1974, Basel city of Switzerland.

- **Nonperforming loans net of provision to capital**

    It is measured to check the potential impact of NPL on capital; its importance is due to its different impact in different circumstances. If it increase it means that it will lead to crises situation so it work as a best alarm for banks to decrease there nonperforming loans to avoid the major problem in future. Due to the unavailability of data we are unable to show the series behavior but if we look at the previous papers, as it is mentioned by Schaeck &cihak in there paper on FSI's the series will move upward from its mean point create a problem for banking sector and it is also seen in 2007 financial crises.

ASSETS QUALITY

- **Nonperforming loans to total gross loans**

    It is also used as a proxy for asset quality, according to IMF statement if interest payment is 90 days due after the passage of interest payment time, the following loans should be counted as NPL. The measuring formula for this statement is

    $$\frac{NPL\ VALUE}{total\ value\ of\ the\ loan\ portfolio}$$

    When the NPL ratio to total gross loans start increasing it means that bank is going to face the issues of low return and slow business, which will create negative signal for market and from the overall sides bank will going to face losses. As we see in figure 3 in Pakistan NPL is showing increasing trend from 2007 to 2011, which give negative signal of banks strength and management in the market. As we see it is highest as compare to selected countries even at 2015 but showing decreasing trend from 2011 to onward. One of the major reasons is the shifting of government from dictatorship to democracy and Benazir murder incidence creates a harmful condition for business in Pakistan. As compare to other countries Spain series is also showing upward trend from 2010 to 2013 but start decreasing from 2013 to onward, it was the impact of European financial crises which Spain cannot bare as other countries did. But from 2009 to onward we can see that India figure is showing upward trend which was shown increasing in 2014.

- **Sectorial distribution of loans to total loans**

This portion describes the management efficiency in diversifying the risk, sometimes it is advised by central banks of the country to loan the following sectors to increase the development in that one. In developing countries the major portion is submitted for the industrial sector to move toward industrialization from agriculture side to compete with the world. As we see in the aggregate reports of state bank of Pakistan (SBP) that in previous year's major chunk is allocated for small scale industrialization to improve the living standard and to create opportunities for citizens. Another major chunk is allocated to support government on going plans. Sectorial distribution of loan technique is used to develop the selected sectors of the economy. As discusses in the introduction that depository sector is work as intermediary in country between borrowers and lenders, so this portion show the management techniques of banks too. As we see in the 2007-08 financial crises major part of loans are distributed to housing sector which lead towards crises because they are transformed into NPL's.

EARNINGS AND PROFITABILITY

- **Return on assets**

  This instrument measures the efficiency of management in using assets to generate earnings or profitability. Measuring technique for ROA is

  $$\frac{Earning}{Total\ Assets}$$

  Figure-4 is showing us the earning condition of selected countries from 2005 to 2015 on assets. Other than India all are showing downward movement at 2007-08. The series of USA and Pakistan is showing high decreasing trend from 2006. The major fall is seen in Spain series from 2011-12. Return on assets show the management capability of diversifying risk to generate well for the depository institutions and to survive in the market for further operations. The series of USA start decreasing from 2006 to 2008 which shows that USA is moving toward crises and it move to the negative points when officially govt. of USA declares the recession but it starts moving upward in 2009 with a bailout plan by government.

- **Return on equity**

It measures the profitability by measuring the shareholders' investment. It is the net income return as a % of shareholders equity. Formula to measure is:

$$\frac{Net\ Income}{Shareholder's\ Equity}$$

The ratio measures the profitability of depository sector by comparing its income with its average shareholder's equity. It means how much shareholders are earning by investing in the sector. If the ratio is high it means the investors earning high and management is working well and sounds good to the investors. Through this ratio the sector is on the line to compare with other sectors in the market. For Pakistan according to the data the series shows downward slope till 2008 and little upward from 2008-09 and then downward till 2010. The downward slope of the series mean that investment in depository sector by investor's in Pakistan does not sound good till 2010. For Germany and UK from 2007 investors is not getting good signal to go onward with depository sector but slightly upward movement of figure showing the improvements in sector. Spain and UK series further move to negative side from 2011-12. From 2007-09 USA series showed downward slope but doesn't move to the negative points. On the other hand series of China, India, Indonesia, Malaysia and Singapore are performing well which shows there stability in financial crises.

- **Interest margin to gross income**

It is a percentage of financial institution earning on loans minus the interest which was paid on the borrowed funds divided on the average amount of assets on which income is earned.

$$\frac{\frac{Interest\ Income}{Interest\ paid}}{Average\ loan\ to\ customers}$$

As an intermediary it is the basic function of depository sector to issue liabilities and by using proceeds to purchase income earning assets. It's become a role of management to make better options to earn good profits on its assets and low cost on its issued liabilities. So how well banks manage its assets and liabilities are affected by the interest earned on assets and interest cost on its liabilities. Same as if banks are able to raise funds with low cost liabilities and acquire assets with high interest then the net interest margin should be high. If the interest cost of liabilities will rise relative to the interest on assets than the interest margin will decrease. Here the variable is interest margin to gross income ratio so we are talking about interest margin with gross income. So here we are comparing the net interest income with depository sector gross income and plotted the yearly ratios in the figure. According to plotted series all series are behaving normally but Pakistan series is high as compare to other till 2009 and then move upward from 2012. On the other hand Germany has the lowest ratio as compare to selected countries.

- **Non-interest expenses to gross income**

It is also known as the fixed operating cost, which institution must have to incur. It include salaries for officers and tellers working in depository institutions, building rents and purchases of equipment's to run the business. Another major part of non-interest expenses include the provisions of loan losses. When a bank anticipate that a loan might become a bad debt, he mention it as a current expense in its income statement, for that case bank set aside a portion of earning to deal with loan losses in future.

Figure-7 illustrate the series of non-interest expenses to gross income ratio, here the series of UK shows high expenses, which reached the level of 80 points in 2013. Mostly the expenses increase when loan losses increase or new depository institution enters in the sector with operating cost only. Pakistan series is moving smooth means there is not any major change in the expenses of sector. On the other hand Indonesia series showing decreasing trend from 2014 to onward.

LIQUIDITY

- ## **Liquid assets to total assets**

Liquid assets mostly include currency which a banking institution has to use for daily business to manage the customer's requirement.

The major component of liquid assets in whole world is currency because of its high liquidity definition and its importance in the daily life. Mostly monetary financial institutions hold little cash preferring to use it for productive usage but it varies from country to country. With passage of time due to developments in technology, liquidity ratio in developed countries decreased. But the decrease in liquid assets to total asset ratio yields to zero and this approach can be hazardous for depository sector and even lead to liquidity trap or crises and affect the financial health and survival of institution. In developing countries or underdeveloped countries the ratio is high because of little advancement in technology usage but even in developed countries banks maintain certain ratio to avoid the shortage of liquidity. Here in figure-8 the series of Spain are moving near to 0 or bottom line from 2010 to onward which means Spain depository sector facing the problem. On the other side series of Pakistan and Germany are highest among all of the selected countries. The liquidity ratio also shows the residents behavior, that what they prefer to use. Germany is a developed country but high series showing that in Germany people prefer to carry cash as compare to other developed countries. Same as in Pakistan due to low development people prefer cash and depository institutions manage the ratio to meet the requirements of the customers. Rising series of japan from 2012 to onward shows that, to avoid any kind of alarming situation or due to people requirements depository institutions increase the ratio.

- **Liquid assets to short-term liabilities**

This ratio tells about that how much cash banks have to fulfill the short term liabilities according to central banks of the country it was obligatory for every bank to have a certain amount of ratio to its short term liabilities.

Liabilities are counted as short term liabilities when they have period less than 1 year, it mostly includes the current accounts in banks. Individuals save their money in banks for security purposes to avoid any misshape, so bank works as a wallet for individuals. The ratio is high in countries where transactions are mostly based on cash instead of online transactions. Here in Figure-9 the series of Germany is higher than all, it means that in Germany people prefer cash transaction as compare to online, so depository sector have to maintain liquid assets to manage the individuals requirements. as compare to Germany individuals in Pakistan prefer cash transaction due to which its series also showing high points and still increasing. On the other hand the series of USA also shown increasing trend but become normal at 2013. Indonesian series are high but looking constant as compare to Pakistan, Germany and USA. Other countries series are stable and showing low ratio which means that individuals of following countries prefer developed tricks or online transactions as compare to having liquid assets in pocket.

SENSTIVITY TO MARKET RSK

- **Net open position in foreign exchange to capital**

This portion covers the institution position of holding capital to deals the losses of foreign currency it hold for short or long period because of the volatility of currency.

The volatility in exchange markets put greater effect on the business activities of any country, especially when occur in USA dollar. As a base asset for most countries dollar fluctuations put major effect on the profit and losses of depository sector. Depository sectors set aside a portion of capital to deal with this kind of issues, and this ratio decrease or increase with the surrounding news in markets. When largest exporting countries like China and USA do little operations to depreciate or appreciate their currencies to maintain their balance of payments, these operations not only affect other linked countries trade or living standards but also affect the ratios of depository sector. Depository sector as an intermediary between traders maintain certain portion of foreign currencies to maintain the need of dealers or traders. For maintaining the need of traders, the depository sector also insures its foreign currency losses by putting a ratio of capital aside to cover the losses.

FIGURE-10 is showing the behavior of selected countries depository sector ratios, which are increasing or decreasing with the passage of time or with increasing or decreasing needs to avoid the major losses. The series of Malaysia is highest among all other selected countries, it means that fluctuations have major effect on Malaysia and to avoid the losses, depository sector increase the ratio. On the other hand the series of UK moved even the beneath of zero point and stayed negative from 2012-M6 to 2013-M6. Other countries series are showing

minor fluctuation which means that they are maintain the certain level of portion to tackle the

losses or they didn't face any major losses which shrink their ratios.

Conclusion

For some indicators we used data from 2005 to onward and for some 2010 to onward, same as in few indicators some countries are missed because the data is not available. The series of all indicators showed positive image of Pakistan's banking sector as compare to selected largest 10 trading partners.

Pakistan depository sector is working according to the Basel accord mentioned improvements to avoid losses. On the other hand the data is showing the positive image of management for making good decisions to generate good revenue and avoid losses.

At some points as the Non-performing loans to gross loans ratio for Pakistan is high but after 2013 it start decreasing and till that period we can see the decrease in return on assets and return on equity. Other than these two mentioned indicators we did not see any effect of non-performing loans on other indicators. (The major reasons are political instability in Pakistan and the role of Afghan war due to which performance of banks according to non-performing loans is not well).

We cannot say clearly that how much the health of banking sector help in the growth of Pakistan from 2005 to 2015 because due to the insurgency and electricity shortfall in country the investment in the country is decreased or loans for investment purposes are decreased.

According to Pakistan's year book of financial year 2005-06 90% of the banks are privatized under financial sector reform program. At the end of Fiscal year 2005 Pakistan accepted 28 out of 30 points of BASEL 2 accord.

As a part of services sector, overall the share of services sector to GDP in 2015 is reached to 58.8%. The impressive performance of finance and insurance sector is contributed by central

bank at 6.8 percent, scheduled banks & non-scheduled banks by 8.3 percent and 20.6 percent, respectively to the GDP[21]. The contribution of banking sector to GDP is the sign of its importance in economic growth of the country.

When we look at the country with worst performance or moving toward loss is Spain. Because in 2008 financial crises Spain left behind and face major loss due to which it has to be applied for €100 billion as a rescue package. But still Spain didn't get out fully from the crises, due to which depository sector data is showing worst position in Spain.

The non-performing loan data of USA is showing increasing trend till 2009 but start decreasing after that due to the bailout package to depository sector by USA FED.

According to analysis we will accept the null hypothesis of first objective that banks performing in Pakistan are working according to IMF KPI's.

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[21] Pakistan economic survey reports

CHAPTER-6

Here in chapter-6 we will test the hypothesis of second objective about the integration of Pakistan with its ten largest trading partners under RIPH framework.

International Integration (Real Interest Parity Hypothesis)

International integration means the holding of real interest parity hypothesis. The theory is based on two theories (uncovered interest rate parity & purchasing power parity). With the passage of time and due to development in the financial sectors, interest rates become center of interest for everyone[22]. Interest rate becomes major source to measure the performance of financial sector, because interest rates become the base of profit and loss for financial institutions (not for banks and other intermediaries who gain in both cases as an agent). To compete with the world, the financial sector of the countries tries to set that amount of interest rate which increase profit and decrease the chance of losses. According to the basic definition uncovered interest rate parity interest rate between two countries will be same due to expected change in exchange rates between the countries. According to the theory the interest rate should be short term because long term interest rate cannot meet the requirements of the theory. Short term interest rates affected by the effects of incidents in the countries, for example if we look at the Pakistan data, the Benazir incident did not affected the long term interest rate (available on bonds) but affected the short term rates (treasury bill rates). Theory suggested that all kind of short term interest rates can be taken and there is not any issue if Treasury bill rate for one country and money market rate for another country is selected to estimate. Because of the availability of same data for all countries is impossible. The results will be more efficient if data of same variable is chosen for all selected countries but every country used different instruments in different phases or in

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[22] Interest rate = Exp [$exchange\ rate_A - exchange\ rate_B$

different needs according to country financial structure or conditions. The other reason for selecting different variables for different countries is that, for same variables the available data is limited, which give bias results.

Now we will look that how uncovered interest rate parity worked according to data, let suppose we are talking about two open economies Pakistan and China. For example the today spot exchange rate for Pakistan/china is 0.07 and the expected future exchange rate for next year is 0.065, and the one-year interest rate in China is 4.35%, so through this information we will calculate the expected one year interest rate in Pakistan by using uncovered interest rate parity.

Here,

$(1 + i (d)) = E (t + k) / S (t) \times (1 + i(c))$

i (d) = domestic interest rate

I(C) = foreign interest rate

E (t + k) = expected rate for future time period form time t

S (t) = spot time period rate

Now by putting values in the formula we will calculate the expected one year interest rate for Pakistan.

$(1 + i (d)) = 0.065/0.07 \times (1 + 4.35)$

So the expected interest rate for Pakistan will be 5.96%

If the parity does not exist then there will be opportunities for investors to make risk free profit by using arbitrage techniques and this may lead the country toward difficult economic conditions[23].

The other part of real interest parity hypothesis is based on purchasing power parity; in simple word the purchasing power of 1kg milk in Pakistan should be same as it is in China. Or in other words if Pak/China exchange rate is 0.066 and the 1kg milk price in Pakistan is 1 rupee than it should be 0.066 in china. If the price differ it mean PPP does not hold for Pakistan and China. There are lot of reasons due to which PPP does not hold, those includes lot of things the basic are cost of production, taxes, tariffs and demand of the product. When we look at PPP for two different countries we don't just focus on one product but the overall value. Suppose if car prices are high in Pakistan after tariffs or due to import costs and low in japan because of their production in Japan. Same as the fruit prices are low in Pakistan and high in Japan due to import cost and there preservation. But together the cost or price ratio of both products (car and fruit) is 2:2 it means the purchasing power parity for Pakistan and China exists. But if the ratio is not equal then purchasing power parity does not exist.

When purchasing power parity and uncovered interest parity exist in two countries than it means that real interest rate parity exists and it means that there is integration between the two selected countries[24].

The existence of integration between two countries did not last for long period because it is impossible for both to gain. It mostly helps the developed countries to gain instead of

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[23] Investor will shift their money to the high profitable zones.
[24] On the behalf of conditions which include (trade, FDI etc.)

underdeveloped or developing ones. Under this perspective polices should be implemented by developing countries like Pakistan to gain major advantages.

There are two types of economies closed and open, integration can occur only in the case of open economies. Closed economies have strict policies toward trade due to which high tariffs create hurdles to the integration. In open economies case integration can exist but depend on the policies of state to protect local producers.

Most of time developed countries set up the rules for developing ones to setup state polices which help the developed ones and the most work policy is of comparative advantage. If countries start following the theory of comparative advantage then developing will only focus on raw materials instead of final products or underdeveloped countries become golden sparrow for developed nations as subcontinent was for England.

The estimation technique used for Real interest parity hypothesis is unit root tests, we applied different unit root tests on real interest differential (RID) series of selected countries with respect to Pakistan (RID series are generated by using equation-6). The stationarity or series have unit will tell us about that either the series is mean reverting or not. Further the mean reverting behavior will be checked through the four points given by Ferreira in his paper[25].

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[25] Does the Real Interest Parity Hypothesis Hold? Evidence for Developed and Emerging Markets

RESULTS OF UNIT ROOT TESTS

- ## Augmented Dickey fuller Test (ADF):

It is the basic test used to check the stationarity of data and mostly used for time series data, as we see in the papers of various researchers[26]. We applied it on monthly time series of real interest differentials (RID series) of selected countries with respect to Pakistan from 1990-M01 to 2015-M12. The test is applied on level and first difference of RID series and 15 lags are selected through Schwarz information criteria.

We applied ADF[27] at level and 1st difference for all variables to check the stationarity of series or to see that either the series are mean reverting or not. At level for intercept inclusion only two variable shows mean reverting behavior or stationarity, Malaysia (PAK) and Singapore (PAK), through Schwarz info. Criterion lags selection at 15 lags. The series of Malaysia (PAK) is stationary at 10% level of significance and Singapore (PAK) series become stationary at 5% level of significance.

At second stage by including trend and intercept the results remained same but only series of Singapore (PAK) showed mean reverting behavior or become stationary at 1% level of significance too.

For further analysis we took the 1st difference of data and applied ADF test again other than series of Spain (PAK) all series showed mean reverting behavior at 1% level of significance or become stationary. Spain (PAK) series didn't show mean reverting behavior even by including intercept and both at a time.

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[26] Alex Luiz Ferreira(2007)

[27] Asteriou, Dimitrios, and Stephen G Hall. *Applied Econometrics*.(2011). 2nd ed. Basingstoke: Palgrave Macmillan.

According to literature if asymmetry is present in the RID series than linear unit root tests suffer the loss of power.

- **DF-GLS ERS test:**

The issues due to which ADF loose its power will be tackled by using the advanced form of unit root test in form of DF-GLS which was proposed by ERS (1996)[28], the test is conducted in E-views-9 program. Lags are selected through Schwarz information criteria which remained 15 through whole test. The test is conducted with intercept only and with both intercept + trend on level and 1st difference. Let first discuss the results from intercept only at level, according to that only three series become stationary. Pak-Malaysia and Pak-USA become stationary or show mean reverting at 5% level of significance and the series of Pak-Spain show mean reverting behavior at 10% level of significance

In second step when test is applied by undertaking both trend and intercept in the rid series of the selected countries at level the only RID series of Pak-Singapore showed mean reverting or stationary behavior at 1% level of significance and two other series of Pak-Indonesia and Pak-Malaysia showed mean reverting behavior at 5% level of significance.

On the other side we check the mean reverting behavior of series at 1st difference, through that procedure with intercept only all series become stationary at 1% except series of Pak-Germany and Pak-Spain at none. At last the test is conducted at 1st difference by including both trend and intercept. According to results all series shoed mean reverting behavior at 1% level of significance except the rid series of Pak-Germany. The only RID series of Pak-Germany

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[28] Elliott, G., Rothenberg, T. J., & Stock, J. H. (1992). Efficient tests for an autoregressive unit root.

remained which doesn't showed mean reverting behavior through whole procedure. In ADF test Pak-Germany series showed mean reverting behavior at 1st difference.

- **KPSS (Kwiatkowski–Phillips–Schmidt–Shin test):**

KPSS test is also used to check the unit root in series as ADF but due to some difference the power of test in rejecting hypothesis become changed to other tests. The test is applied on the all RID series to check the mean reverting behavior of series for Real Interest Parity hypothesis to see international integration of Pakistan with selected trade partners. The test is applied in all ways as ADF and DF-GLS ERS tests are applied on level and 1st difference with intercept and both trend and intercept.

According to KPSS[29] at level with intercept only the series of Pak-Indonesia, Pak-Singapore, Pak-Spain and Pak-UK showed mean reverting behavior at 1% level of significance, same as the series of Pak-Malaysia become stationary at 5% level of significance and the series of Pak-China, Pak-Japan and Pak-USA shown mean reverting behavior at 10% level of significance.

With both trend and intercept including the series of Pak-China, Pak-India, Pak-Japan, Pak-Singapore, Pak-Spain and Pak-UK become stationary at 1% level of significance and the series of Pak-Malaysia reverts to mean at 5% level of significance and at the last the series of Pak-Indonesia become stationary at 10% level of significance. At level only the series of Pak-Germany didn't show mean reverting behavior.

In next step we apply the KPSS test at 1st difference of the rid series. With intercept only the series of Pak-Spain only become stationary at 10% level of significance and with intercept and

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[29] Syczewska, E. M. (2010). *Empirical power of the Kwiatkowski-Phillips-Schmidt-Shin test* (No. 45).

trend both the series of Pak-Germany become stationary at 5% level of significance and at 10%

the series of Pak-Spain become stationary only.

- **Beaulieu and Miron Monthly unit root test:**

The Beaulieu and Miron[30] seasonal unit root test is applied at level. We consider 5 percent

significance level using Frances and Hobijin (1997) critical values for detection of seasonal unit

root. The results show that at the level the calculated values of the t-statistics of π_1 are -

0.001085 for Pak/china, -0.001325 for Pak/Germany, -0.001968 for Pak/India, -0.008467 for

Pak/Indonesia, -0.00809 for Pak/Japan, -0.002988 for Pak/Singapore, -0.003769 for

Pak/Malaysia, -0.00955 for Pak/UK, -0.3294 for Pak/USA and -0.00640 for Pak/Spain. These

calculated values at zero frequency unit root are greater than their critical values, so null

hypothesis cannot be rejected which implies the presence of unit root at zero frequency i.e. series

of Pak/china, Pak/Germany, Pak/India, Pak/Indonesia, Pak/Japan, Pak/Singapore, Pak/Malaysia,

Pak/UK, Pak/USA, and Pak/Spain are all non-stationary at level. Furthermore, for π_2 all

calculated values are greater than their critical values for all series. However, their F-Stats show

significance at 5%, so it is not only enough for stationary of data but also need to be that

calculated values should less than their critical value. Therefore, it is concluded that all series are

non-stationary at level and none of the RID series showing mean reverting behavior (no evidence

of integration among countries).

Again we conducted Beaulieu and Miron seasonal unit root test at 1st difference. We consider 5

percent significance level using Frances and Hobijin (1997) critical values for detection of

seasonal unit root. The results show that at the 1st difference the calculated values of the t-

[30] Franses, P. H., & Hobijn, B. (1997). Critical values for unit root tests in seasonal time series. *Journal of Applied Statistics*, *24*(1), 25-48.

statistics of π_1 for Pak/china, Pak/Germany, Pak/India, Pak/Indonesia, Pak/Japan, -Pak/Singapore Pak/Malaysia, Pak/UK, Pak/USA and Pak/Spain. These calculated values at zero frequency unit root are greater than their critical values, so null hypothesis cannot be rejected which implies the presence of unit root at zero frequency i.e. series of Pak/china, Pak/Germany, Pak/India, Pak/Indonesia, Pak/Japan, Pak/Singapore, Pak/Malaysia, Pak/UK, Pak/USA, and Pak/Spain are all non-stationary at 1st difference too. Furthermore, for π_2 all calculated values are greater than their critical values for all series. However, their F-Stats show significance at 5%, so it's not enough for stationary of data but it also need that the calculated values should be less than their critical value. Therefore, it is concluded that all series are non-stationary at 1st difference as at level. So according to monthly unit root test series doesn't show mean reverting behavior.

- **Zivot Andrews test for structural breaks:**

For incurring structural breaks in RID series this test is applied to check the mean reverting procedure. The test is applied on all RID series by knowing that Zivot Andrews[31] test incur only one break date. The results showed that the series of Pak-Singapore, china, USA, India, Germany and Indonesia become stationary at 1% level of significance. On the other hand the series of Pak-Japan showed mean reverting behavior at 10% level of significance. The series of Spain, United Kingdom and Malaysia didn't show mean reverting behavior.

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[31] Zivot, E., & Andrews, D. W. K. (2002). Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis. *Journal of business & economic statistics*, *20*(1), 25-44.

CONCLUSION

Through the unit root tests we check the mean reverting behavior of series on the basis of either series have unit root or not and we see that at level only few series showed mean reverting behavior but at 1st difference most of the series showed mean reverting behavior. In most of the cases the RID's of Pak-Germany and Pak-Spain didn't show mean reverting behavior at level but reverts toward mean in the case of 1st difference. It's not become clear that which tests will be more helpful or have more power to check the series mean reverting behavior. As we see in monthly unit root test by B&M none of the series become stationary at level and even at first difference. Same as by applying Zivot Andrews test with structural breaks we see that only three of the series are non-stationary which are even stationary in ADF, DF-GLS ERS and KPSS tests.

According to the results of tests we can conclude that other than Pak-Germany and Pak-Spain all other rids are showing mean reverting behavior especially the largest trading partners like USA and China.

According to the estimations of second objective we will accept the null hypothesis for some countries under ADF, DF-GLS, KPSS and Zivot Andrews test but we reject the null hypothesis for all RID series according to the Beaulieu and Miron estimations.

Policy Recommendations:

According to banks financial soundness indicators Pakistani banks are performing according to the Basel Accord but as compare to other countries the NPL ratio is too high, so Pakistani banks have to decrease the ratio as it is decreasing.

From real interest parity hypothesis it will help central bank of Pakistan to set the nominal interest rate in a way that the issues or crises occur in foreign countries or selected trading partners will not harm the economy or the investors and it's become more necessary in the case of China, because of ongoing projects (China Pakistan economic corridor) and USA, because Pakistan face the dollar effect due to instability of $US. According to the study there is high integration among Pakistan and USA, CHINA due to huge trade and lot of FDI (Foreign direct investment) in Pakistan by both largest trading partners, so central bank of Pakistan has to adopt such polices through which Pakistan will not get any negative shock from these two countries.
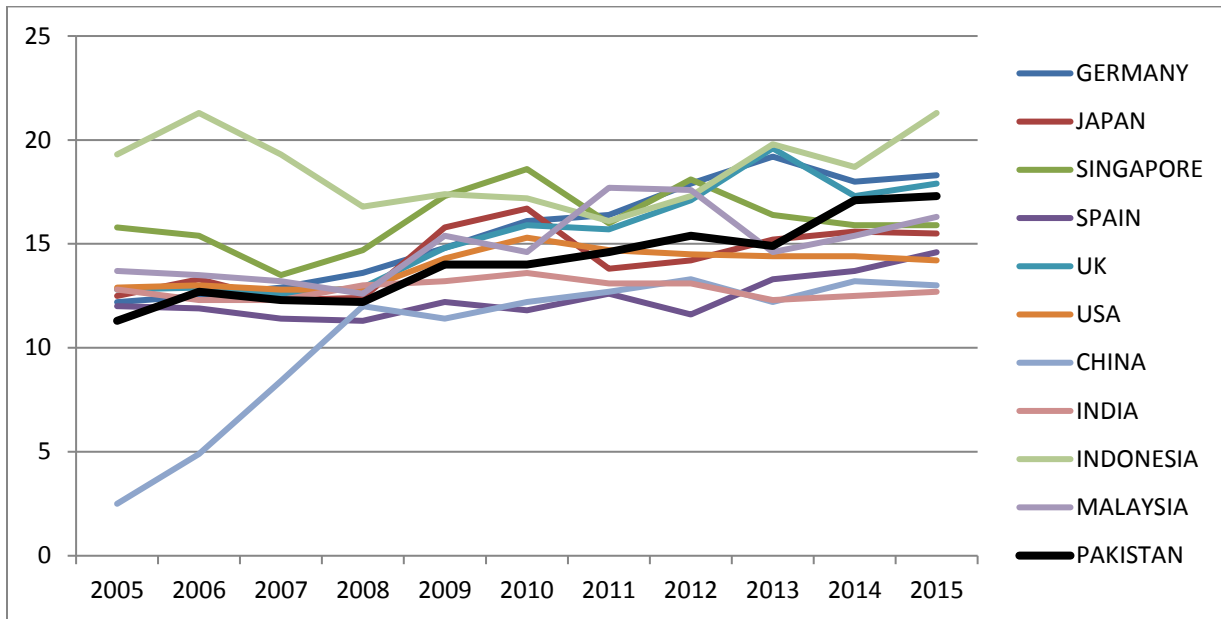
Financial Soundness Indicators Tables

Figure 1- Regulatory Capitals to Risk Weighted Assets
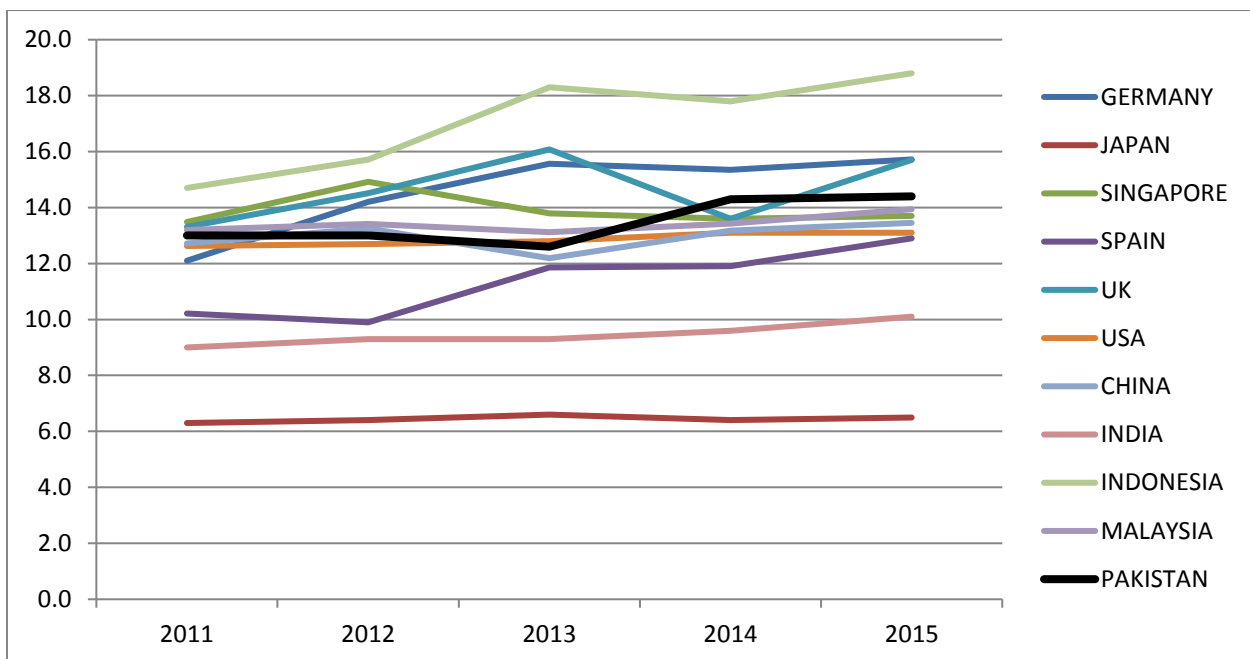
Figure 2-Regulatory tier 1 capital to risk-weighted assets

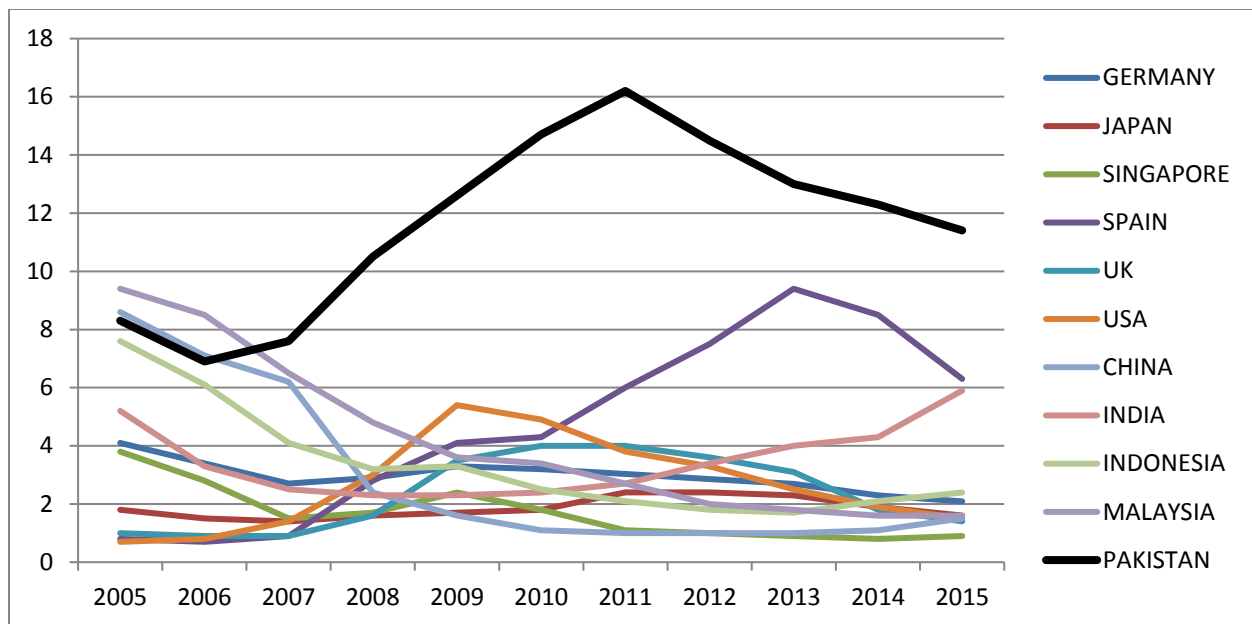**Figure 3-Nonperforming loans to total gross loans**
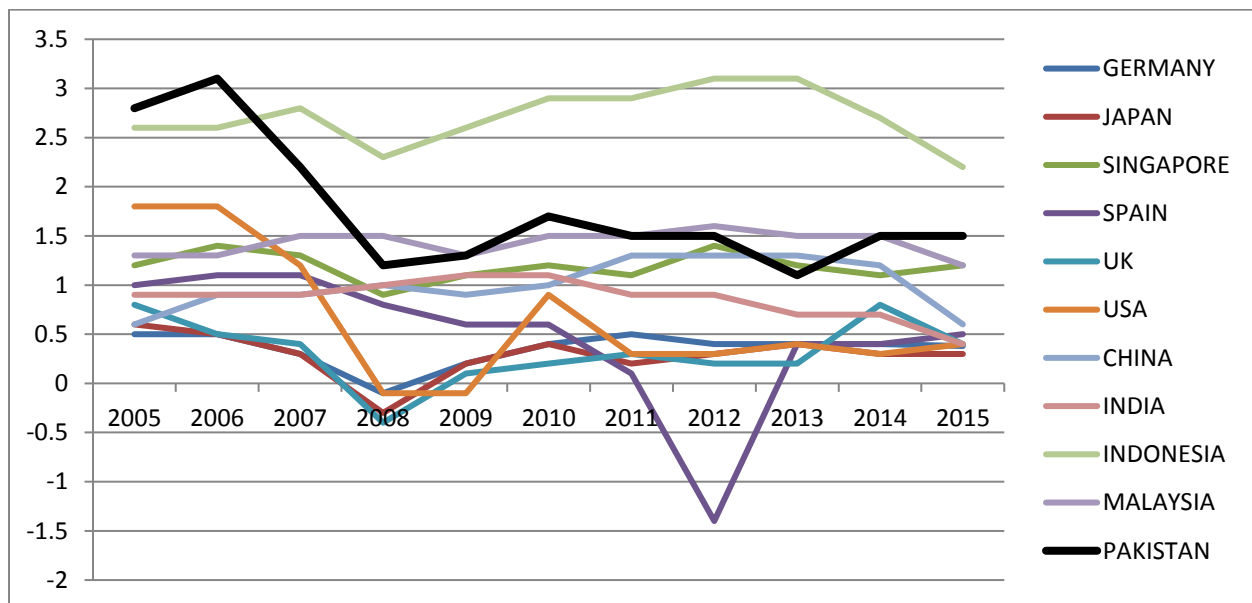
Figure 4- Return on Assets
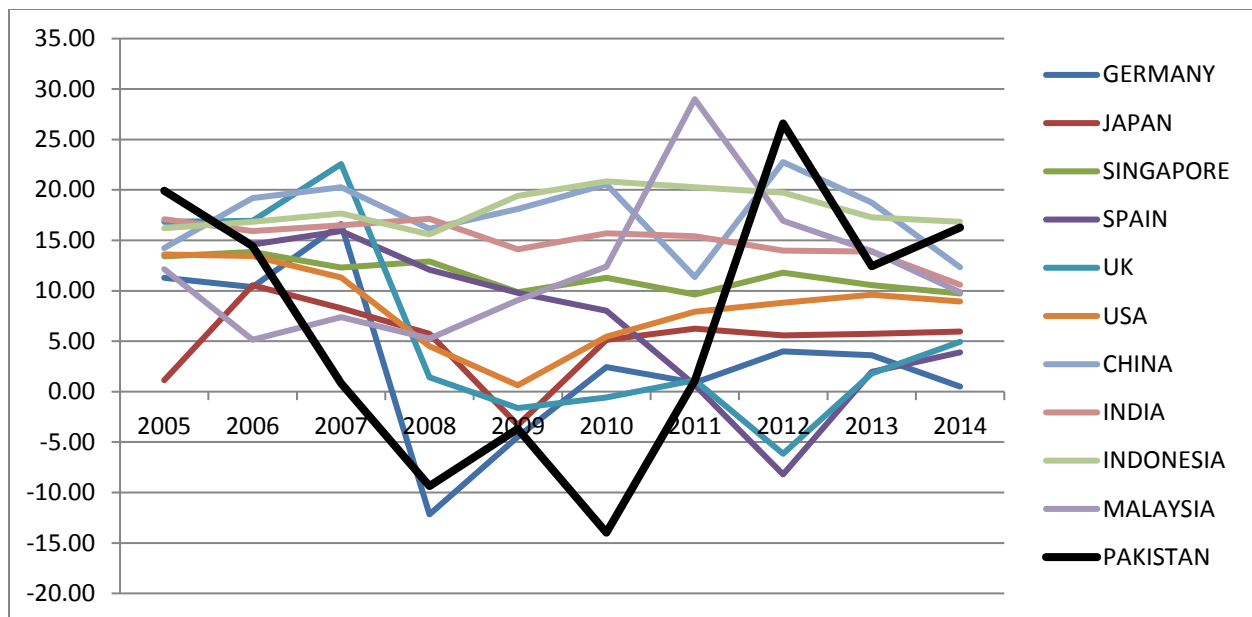
Figure 5- Return on Equity
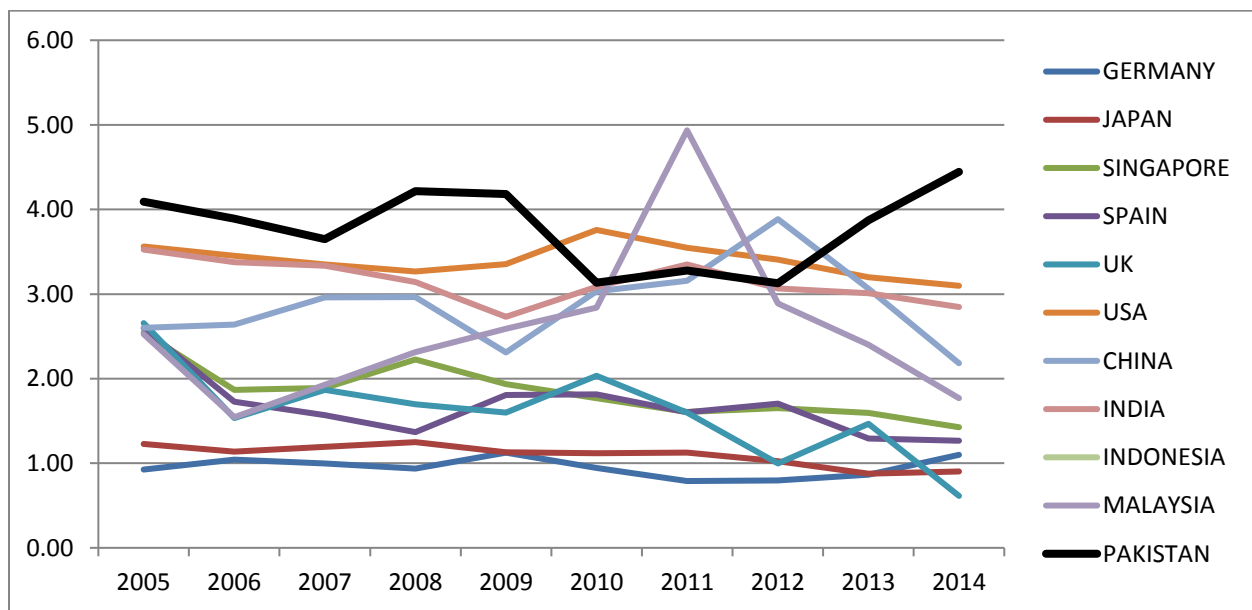
Figure 6- Interest Margin to Gross Income
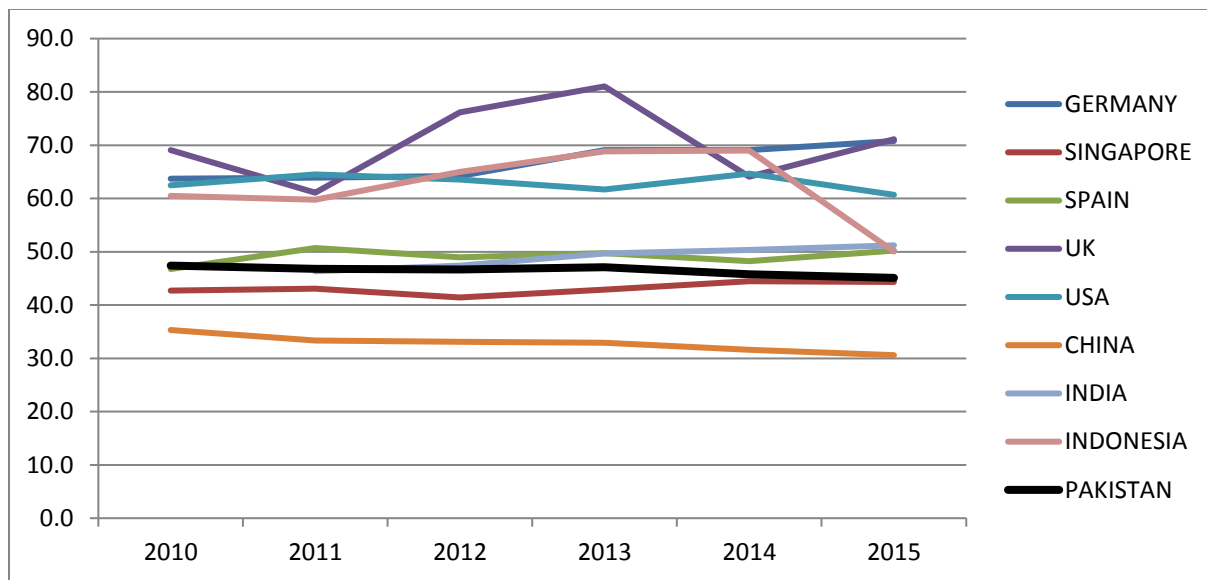
Figure 7- Non-Interest expense to gross income
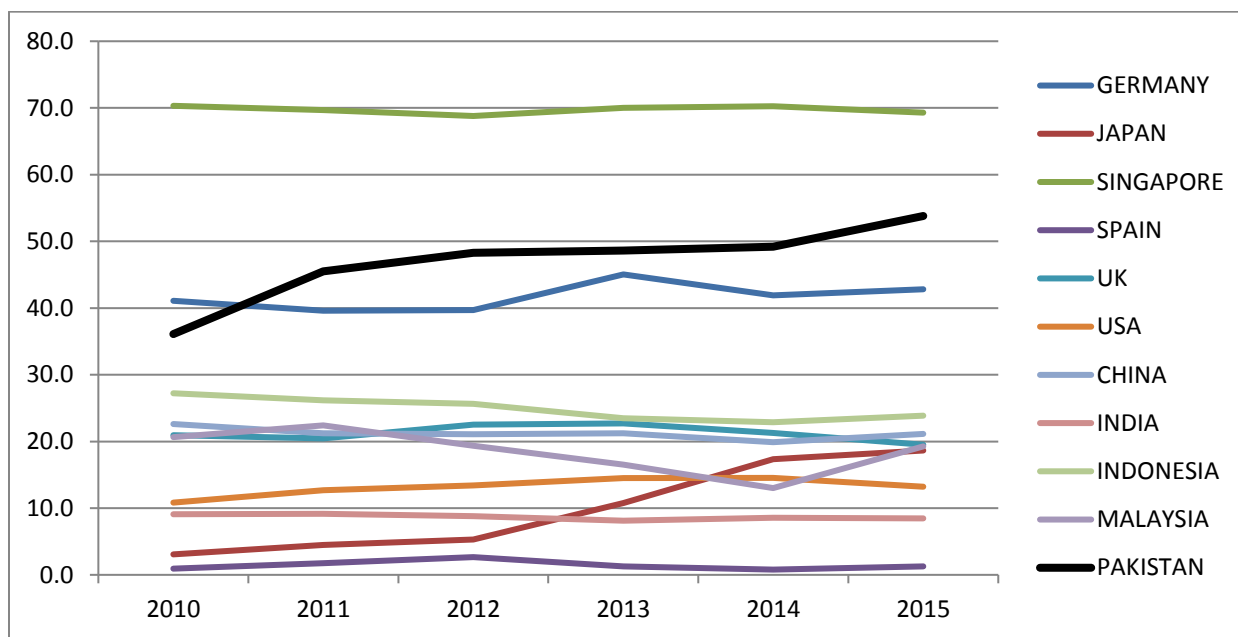
Figure 8- Liquid Assets to total Assets
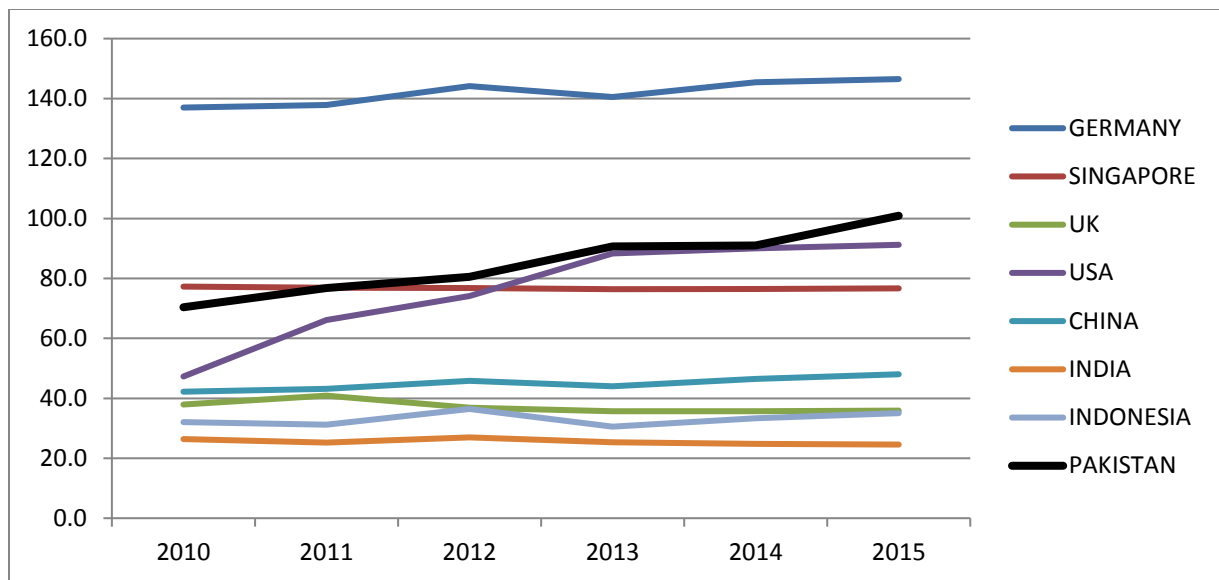
Figure 9- Liquid assets to short-term liabilities
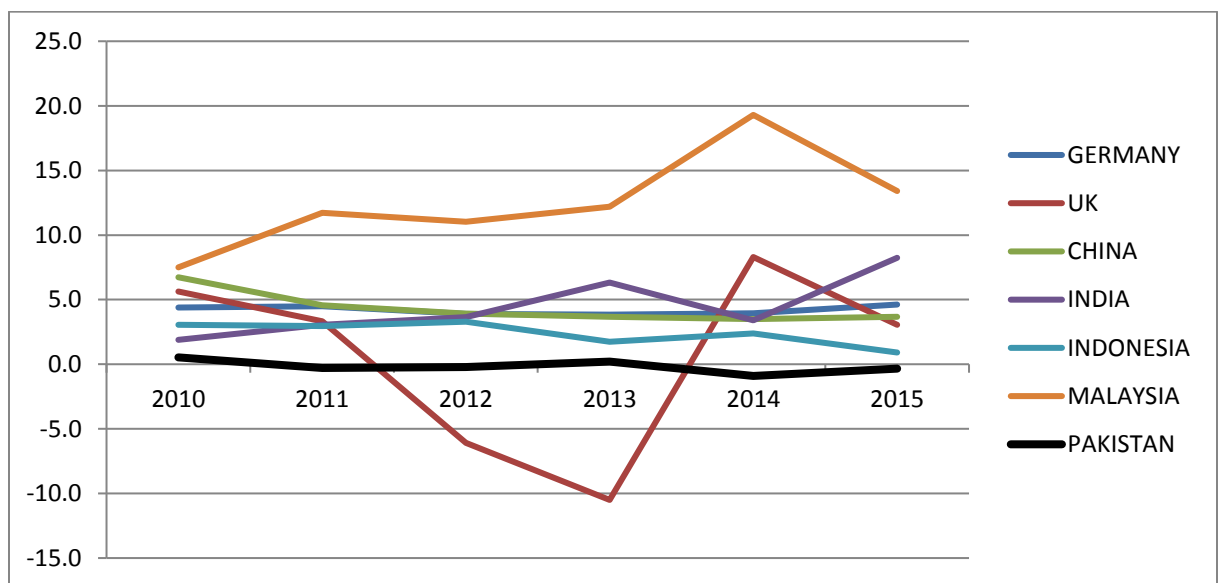
Figure 10-Net open position in foreign exchange to capital

RID'S SERIES GRAPHS

COUNTRY	TYPE OF INTEREST RATE
PAKISTAN	Discount rate
GERMANY	Call money rate
INDIA	Discount rate
INDONESIA	Call money rate
JAPAN	Discount rate
MALAYSIA	3-month T-bill rate
CHINA	Deposit rate
SINGAPORE	Money market rate
SPAIN	Call money rate
UNITED KINGDOM	Discount rate
UNITED STATES OF AMERICA	Discount rate

pak/germany

pak/india

pak/indonesia

pak/japan

pak/malaysia

pak/china

pak/singapore

pak/spain

pak/uk

pak/usa
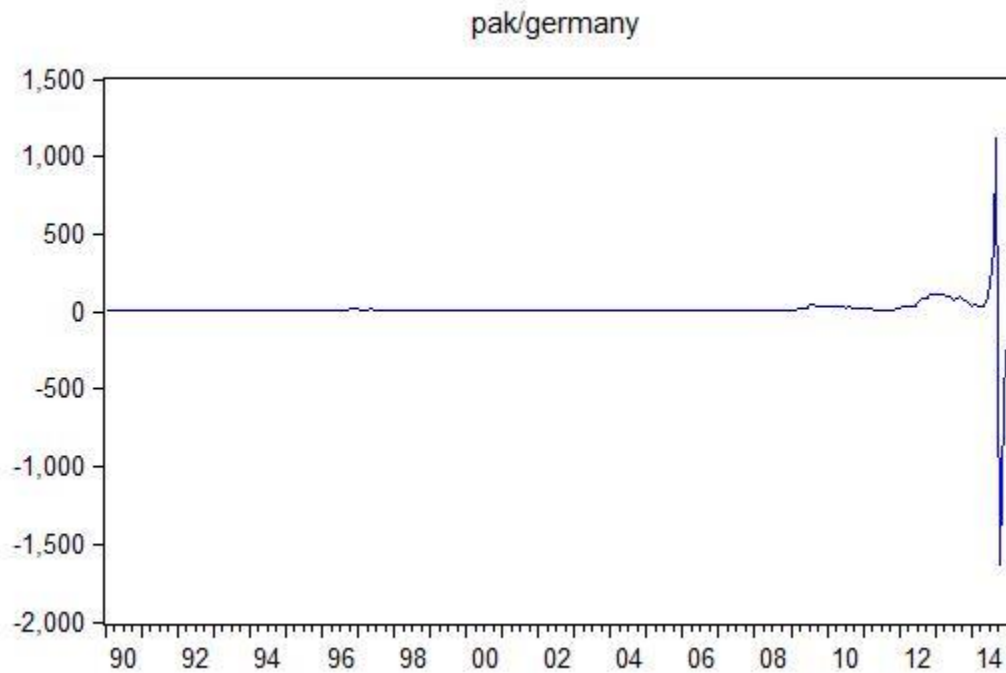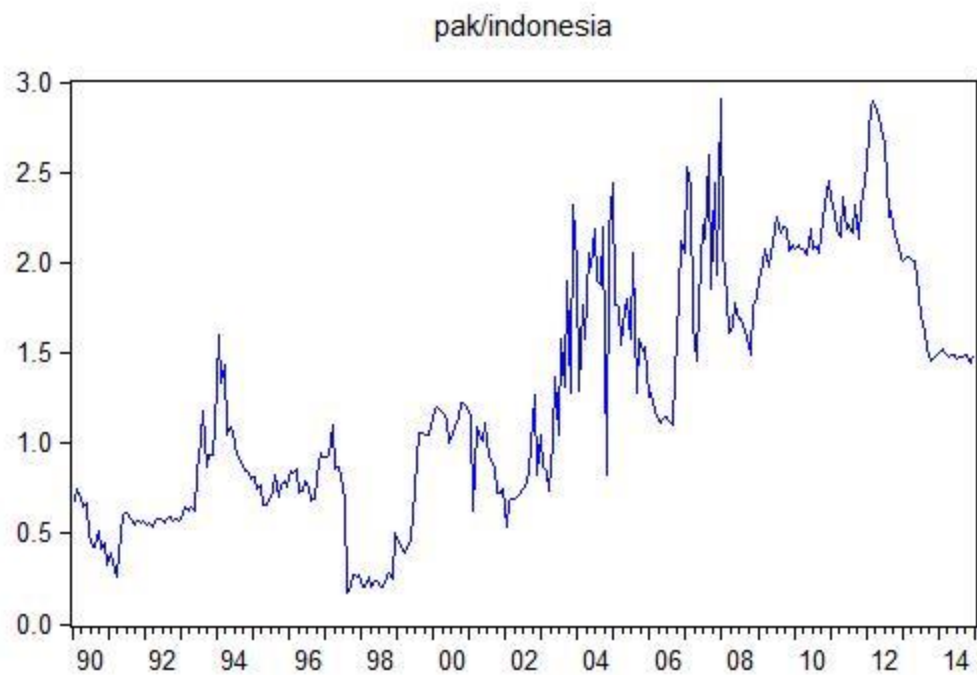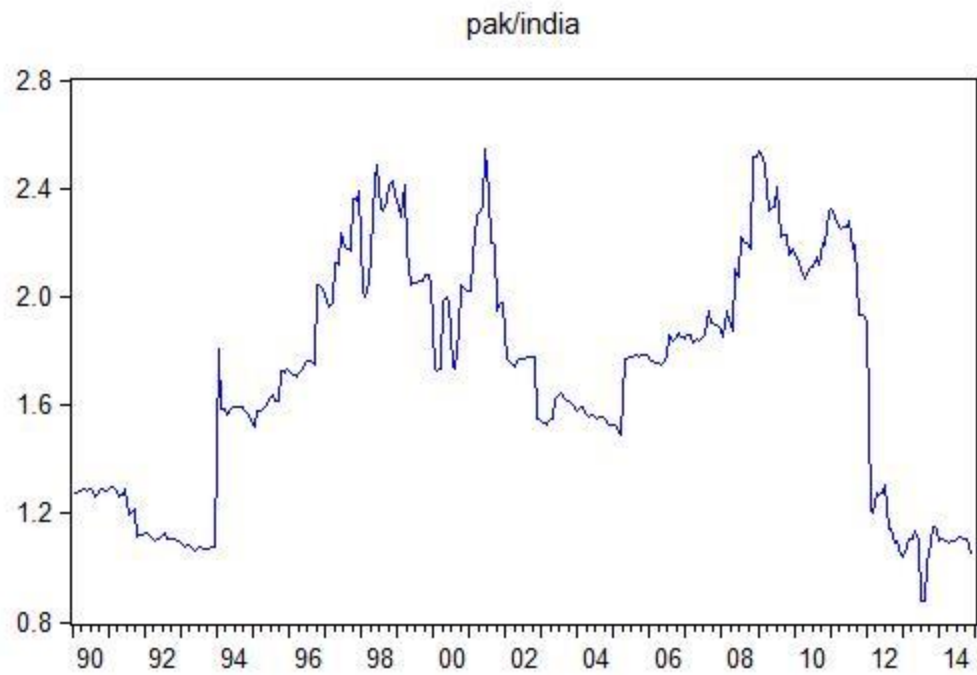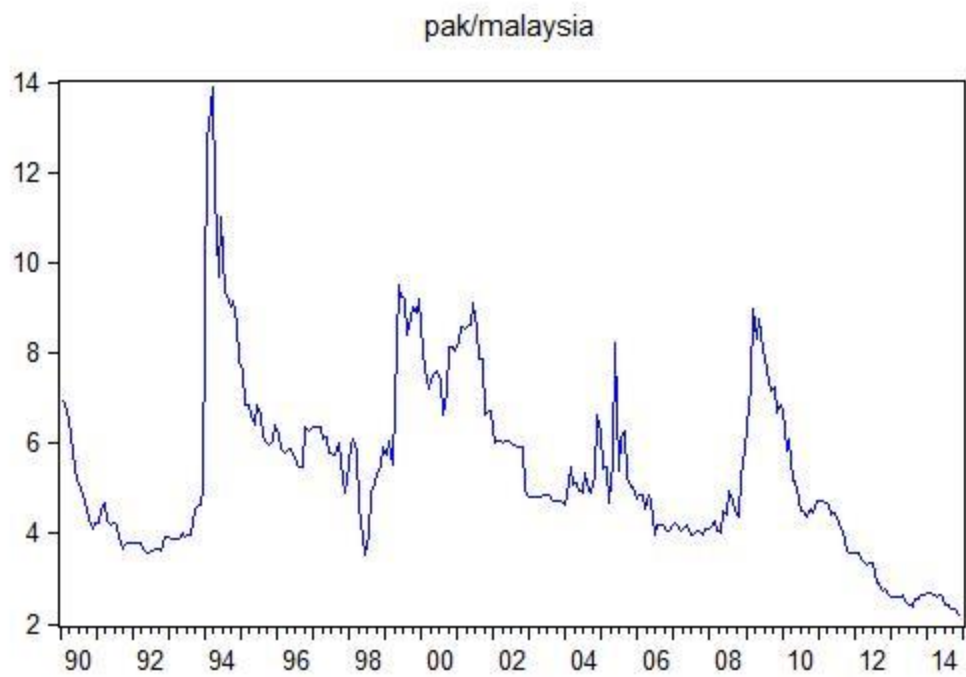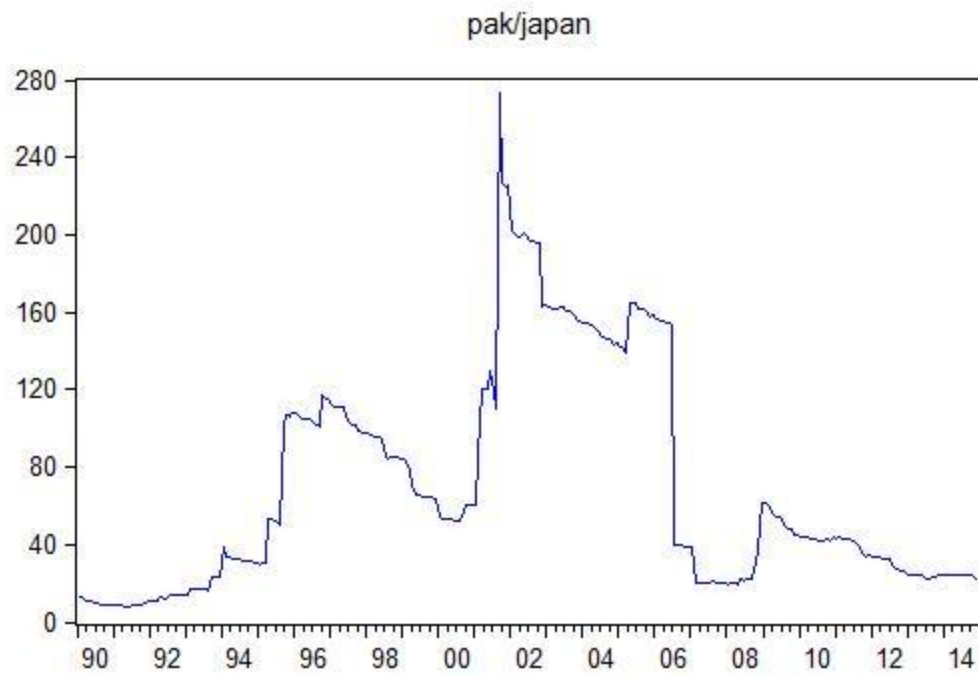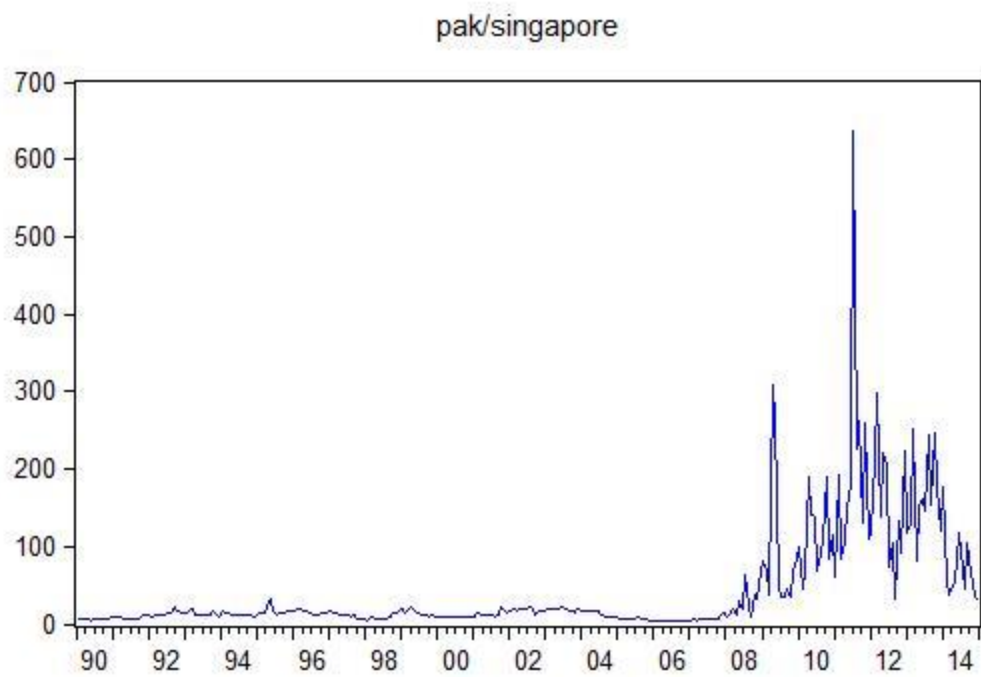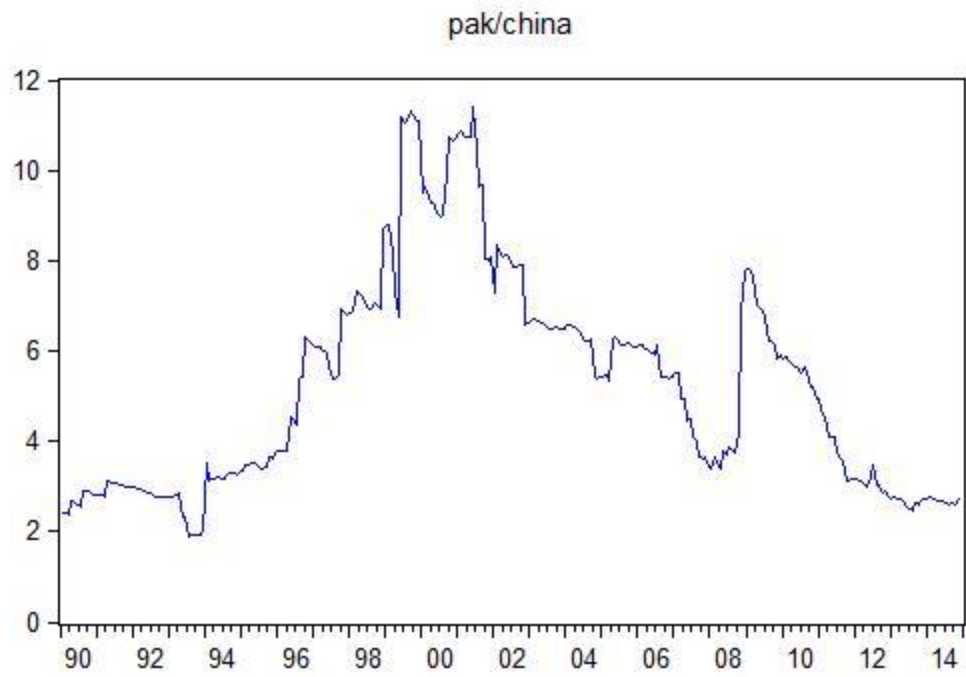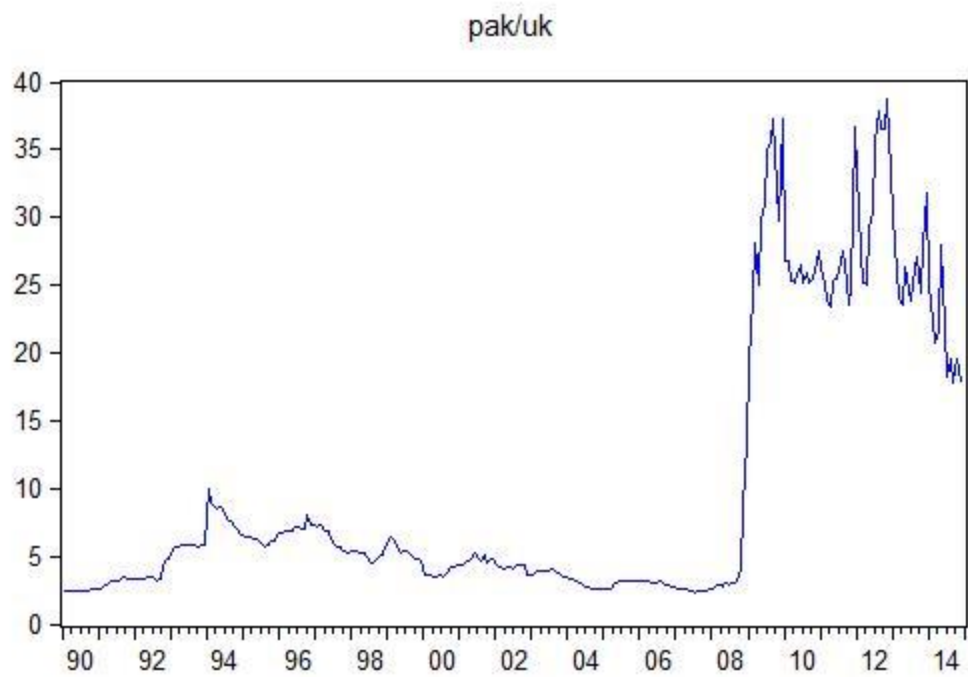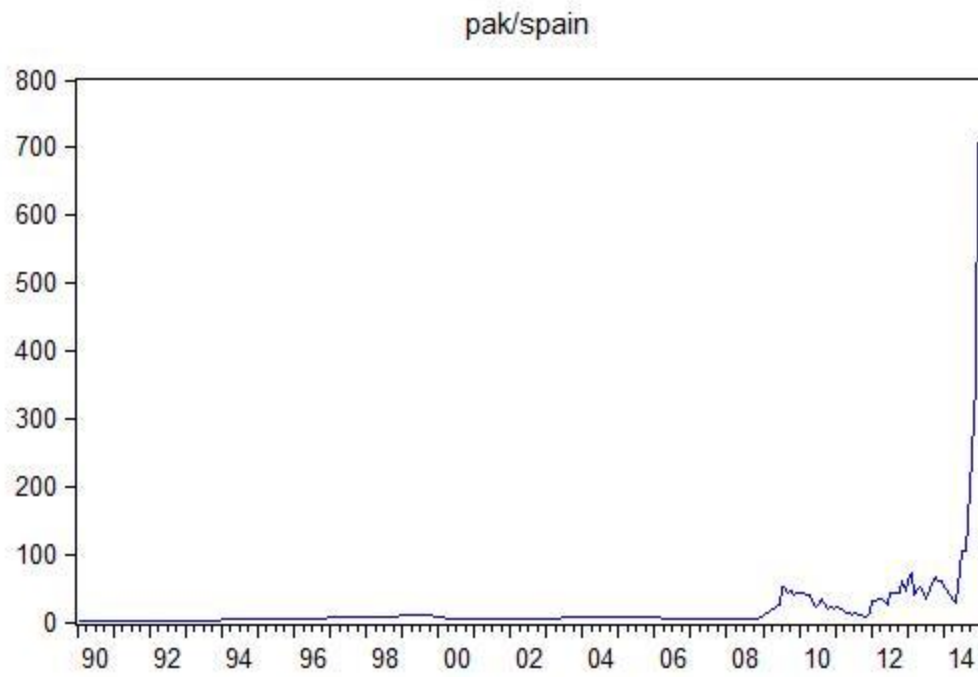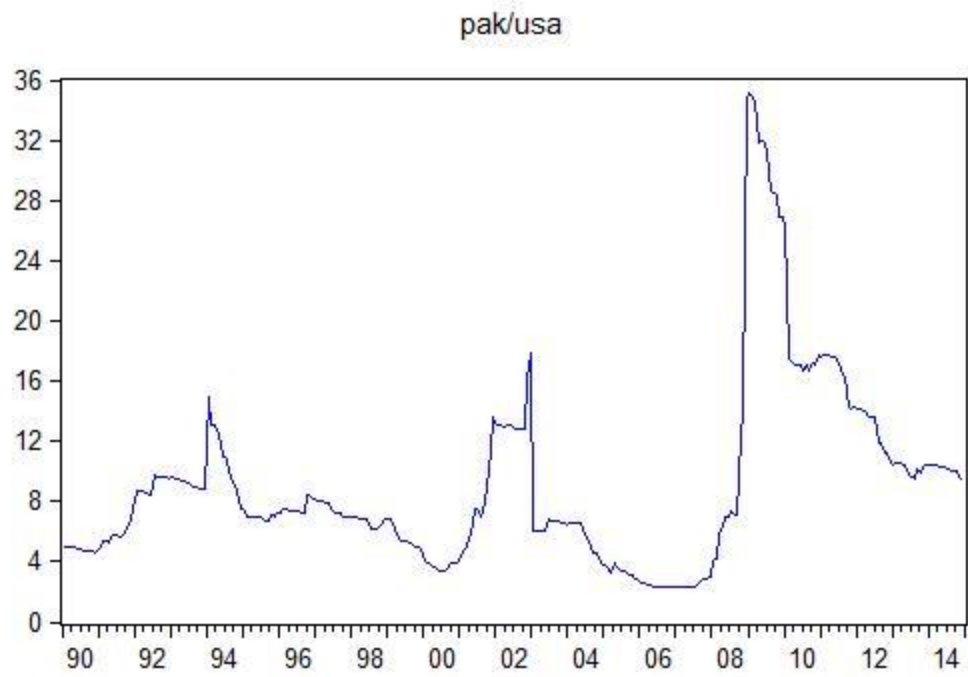
UNIT ROOT TABLES

(*) represents the stationarity at 1%

(**) represents the stationarity at 5%

(***) represents the stationarity at 10%

Augmented Dickey fuller Test

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-INDIA	0.4284	-1.703585	-3.451847	-2.870899	-2.571828
PAK-CHINA	0.4681	-1.625926	-3.451847	-2.870899	-2.571828
PAK-GERMANY	0.3225	-1.920782	-3.452911	-2.871367	-2.572078
PAK-INDONESIA	0.2533	-2.079252	-3.451920	-2.870931	-2.571845
PAK-JAPAN	0.2856	-2.002975	-3.451847	-2.870899	-2.571828
PAK-MALAYSIA	0.0567	-2.819511	-3.451847	-2.870899	-2.571828***
PAK-SINGAPORE	0.0168	-3.278563	-3.452066	-2.870996**	-2.571880
PAK-SPAIN	1.0000	2.423344	-3.453072	-2.871438	-2.572116
PAK-UK	0.4743	-1.613801	-3.451847	-2.870899	-2.571828
PAK-USA	0.1624	-2.332682	-3.451847	-2.870899	-2.571828

Table 1 ADF at level intercept only

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-INDIA	0.8109	-1.547718	-3.988737	-3.424775	-3.135465
PAK-CHINA	0.7904	-1.601693	-3.988737	-3.424775	-3.135465
PAK-GERMANY	0.2230	-2.735857	-3.990243	-3.425506	-3.135896
PAK-INDONESIA	0.1232	-3.039802	-3.988840	-3.424825	-3.135494
PAK-JAPAN	0.7393	-1.722032	-3.988840	-3.424825	-3.135494
PAK-MALAYSIA	0.0973	-3.147791	-3.988737	-3.424775	-3.135465***
PAK-SINGAPORE	0.0000	-5.753815	-3.988840*	-3.424825**	-3.135494***
PAK-SPAIN	1.0000	1.765372	-3.990470	-3.425616	-3.135961
PAK-UK	0.5832	-2.027972	-3.988737	-3.424775	-3.135465
PAK-USA	0.3929	-2.373129	-3.988737	-3.424775	-3.135465

Table 2 ADF at level with intercept and trend

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-INDIA	0.0000	-17.86471	-3.452141*	-2.871029	-2.571897
PAK-CHINA	0.0000	-17.13149	-3.452141*	-2.871029	-2.571897
PAK-GERMANY	0.0000	-6.394033	-3.453153*	-2.871474	-2.572135
PAK-INDONESIA	0.0000	-27.06708	-3.452141*	-2.871029	-2.571897
PAK-JAPAN	0.0000	-19.97990	-3.452141*	-2.871029	-2.571897
PAK-MALAYSIA	0.0000	-16.93901	-3.452141*	-2.871029	-2.571897
PAK-SINGAPORE	0.0000	-10.98887	-3.452596*	-2.871229	-2.572004
PAK-SPAIN	1.0000	13.21089	-3.452519	-2.871195	-2.571986
PAK-UK	0.0000	-17.05456	-3.452141*	-2.871029	-2.571897
PAK-USA	0.0000	-16.20804	-3.452141*	-2.871029	-2.571897

Table 3 ADF at 1st difference with intercept only

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-INDIA	0.0000	-17.91460	-3.989153*	-3.424977	-3.135584
PAK-CHINA	0.0000	-17.18538	-3.989153*	-3.424977	-3.135584
PAK-GERMANY	0.0000	-6.560523	-3.990585*	-3.425671	-3.135994
PAK-INDONESIA	0.0000	-27.02464	-3.989153*	-3.424977	-3.135584
PAK-JAPAN	0.0000	-19.99603	-3.989153*	-3.424977	-3.135584
PAK-MALAYSIA	0.0000	-16.91365	-3.989153*	-3.424977	-3.135584
PAK-SINGAPORE	0.0000	-10.96995	-3.989798*	-3.425290	-3.135769
PAK-SPAIN	1.0000	13.12739	-3.989689*	-3.425237	-3.135737
PAK-UK	0.0000	-17.02584	-3.989153*	-3.424977	-3.135584
PAK-USA	0.0000	-16.18327	-3.989153*	-3.424977	-3.135584

Table 4 ADF at 1st difference with intercept and trend

DF-GLS ERS UNIT ROOT TEST

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-INDIA	0.1524	-1.434	-2.572	-1.941	-1.615
PAK-CHINA	0.2586	-1.131840	-2.572	-1.941	-1.615
PAK-GERMANY	0.7797	0.279	-2.573	-1.941	-1.615
PAK-INDONESIA	0.1390	-1.4833	-2.572	-1.941	-1.615
PAK-JAPAN	0.1948	-1.2993	-2.572	-1.941	-1.615
PAK-MALAYSIA	0.0291	-2.1925	-2.572	-1.941**	-1.615
PAK-SINGAPORE	0.1090	-1.6076	-2.572	-1.941	-1.615
PAK-SPAIN	0.0593	1.893	-2.572	-1.941	-1.615***
PAK-UK	0.3034	-1.0309	-2.572	-1.941	-1.615
PAK-USA	0.0516	-1.9541	-2.572	-1.941**	-1.615

Table 5 dfgls ers intercept only at level

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-INDIA	0.1294	-1.5206	-3.469	-2.9102	-2.605
PAK-CHINA	0.2243	-1.2177	-3.469	-2.9102	-2.605
PAK-GERMANY	0.2024	1.2778	-3.468	-2.9132	-2.6102
PAK-INDONESIA	0.0024	-3.0621	-3.469	-2.9102**	-2.605
PAK-JAPAN	0.0891	-1.7054	-3.469	-2.9102	-2.605
PAK-MALAYSIA	0.0017	-3.1710	-3.469	-2.9102**	-2.605
PAK-SINGAPORE	0.0000	-5.5858	-3.469*	-2.9102	-2.605
PAK-SPAIN	0.1181	-1.5677	-3.4693	-2.9112	-2.607
PAK-UK	0.0466	-1.9981	-3.4699	-2.9102	-2.605
PAK-USA	0.0165	-2.4123	-3.4699	-2.9102	-2.6053

Table 6 dfgls ers trend and intercept at level

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-INDIA	0.0000	-17.894	-2.572*	-1.941	-1.615
PAK-CHINA	0.0000	-17.151	-2.572*	-1.941	-1.615
PAK-GERMANY	0.1682	-1.381	-2.573	-1.941	-1.615
PAK-INDONESIA	0.0000	-25.250	-2.572*	-1.941	-1.615
PAK-JAPAN	0.0000	-20.012	-2.572*	-1.941	-1.615
PAK-MALAYSIA	0.0000	-16.966	-2.572*	-1.941	-1.615
PAK-SINGAPORE	0.0000	-11.008	-2.572*	-1.941	-1.615
PAK-SPAIN	0.9648	0.044	-2.573	-1.941	-1.615
PAK-UK	0.0000	-17.077	-2.572*	-1.941	-1.615
PAK-USA	0.0000	-16.233	-2.572*	-1.941	-1.615

Table 7 dfgls ers intercept only at 1st difference

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-INDIA	0.0000	-17.929	-3.469*	-2.910	-2.605
PAK-CHINA	0.0000	-17.165	-3.469*	-2.910	-2.605
PAK-GERMANY	0.0876	1.714	-3.468	-2.913	-2.610
PAK-INDONESIA	0.0000	-26.643	-3.469*	-2.910	-2.605
PAK-JAPAN	0.0000	-20.028	-3.469*	-2.910	-2.605
PAK-MALAYSIA	0.0000	-16.968	-3.469*	-2.910	-2.605
PAK-SINGAPORE	0.0000	-10.928	-3.469*	-2.911	-2.607
PAK-SPAIN	0.0000	-5.636	-3.468*	-2.912	-2.609
PAK-UK	0.0000	-17.0802	-3.469*	-2.910	-2.605
PAK-USA	0.0000	-16.234	-3.469*	-2.910	-2.605

Table 8 dfgls ers intercept and trend at 1st difference

KPSS UNIT ROOT TEST

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-CHINA	0.0000	0.389226	0.739000	0.463000	0.347000***
PAK-GERMANY	0.0817	0.179214	0.739000	0.463000	0.347000
PAK-INDIA	0.0000	0.293868	0.739000	0.463000	0.347000
PAK-INDONESIA	0.0000	1.534044	0.739000*	0.463000	0.347000
PAK-JAPAN	0.0000	0.352323	0.739000	0.463000	0.347000***
PAK-MALAYSIA	0.0000	0.519189	0.739000	0.463000**	0.347000
PAK-SINGAPORE	0.0000	1.054425	0.739000*	0.463000	0.347000
PAK-SPAIN	0.0000	0.886114	0.739000*	0.463000	0.347000
PAK-UK	0.0000	1.040356	0.739000*	0.463000	0.347000
PAK-USA	0.0000	0.416599	0.739000	0.463000	0.347000***

Table 9-kpss at level intercept only

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-CHINA	0.0000	0.388387	0.216000*	0.146000	0.119000
PAK-GERMANY	0.9164	0.052814	0.216000	0.146000	0.119000
PAK-INDIA	0.0000	0.236524	0.216000*	0.146000	0.119000
PAK-INDONESIA	0.0000	0.130241	0.216000	0.146000	0.119000***
PAK-JAPAN	0.0000	0.351759	0.216000*	0.146000	0.119000
PAK-MALAYSIA	0.0000	0.175854	0.216000	0.146000**	0.119000
PAK-SINGAPORE	0.0002	0.278611	0.216000*	0.146000	0.119000
PAK-SPAIN	0.0045	0.250948	0.216000*	0.146000	0.119000
PAK-UK	0.0534	0.303219	0.216000*	0.146000	0.119000
PAK-USA	0.0000	0.111286	0.216000	0.146000	0.119000

Table 10-kpss at level intercept and trend

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-CHINA	0.2924	0.060972	0.216000	0.146000	0.119000
PAK-GERMANY	0.9325	0.039888	0.216000	0.146000	0.119000
PAK-INDIA	0.3624	0.051649	0.216000	0.146000	0.119000
PAK-INDONESIA	0.8162	0.050957	0.216000	0.146000	0.119000
PAK-JAPAN	0.4805	0.043518	0.216000	0.146000	0.119000
PAK-MALAYSIA	0.9933	0.031610	0.216000	0.146000	0.119000
PAK-SINGAPORE	0.9317	0.052588	0.216000	0.146000	0.119000
PAK-SPAIN	0.0883	0.147763	0.216000	0.146000	0.119000***
PAK-UK	0.8319	0.063598	0.216000	0.146000	0.119000
PAK-USA	0.7843	0.037733	0.216000	0.146000	0.119000

Table 11-kpss at 1st difference intercept only

COUNTRY	PROB.	T-STATISTIC	1%	5%	10%
PAK-CHINA	0.9651	0.2223	0.7390	0.4630	0.3470
PAK-GERMANY	0.9367	0.5000	0.7390	0.4630**	0.3470
PAK-INDIA	0.8980	0.2032	0.7390	0.4630	0.3470
PAK-INDONESIA	0.8469	0.0495	0.7390	0.4630	0.3470
PAK-JAPAN	0.9655	0.1568	0.7390	0.4630	0.3470
PAK-MALAYSIA	0.6873	0.0324	0.7390	0.4630	0.3470
PAK-SINGAPORE	0.9797	0.0516	0.7390	0.4630	0.3470
PAK-SPAIN	0.0750	0.4098	0.7390	0.4630	0.3470***
PAK-UK	0.6118	0.0621	0.7390	0.4630	0.3470
PAK-USA	0.8722	0.0416	0.7390	0.4630	0.3470

Table 12-kpss at 1st difference intercept and trend

Beaulieu and Miron Unit Root Test

At level

Hypothesis	Pak/China	Pak Germany	Pak India	Pak Indonesia	Pak Japan	Pak Singapore	Pak Malaysia	Pak UK	Pak USA	Pak Spain
$t : \pi_1 = 0$	-0.001085 (-2.78)	0.001325 (-2.78)	-0.001968 (-2.78)	-0.008467 (-3.32)	-0.00809 (-2.76)	-0.002988 (-2.76)	-0.003769 (-3.32)	-0.00955 (-2.76)	-0.03294 (-2.76)	0.000640 (-1.87)
$t : \pi_2 = 0$	-0.158421 (-1.89)	-0.204107 (-1.89)	-0.11757 (-1.89)	-0.153155 (-2.79)	-0.20597 (-2.79)	-0.187023 (-2.79)	-0.206703 (-2.79)	-0.196765 (-2.79)	-0.19754 (-2.79)	-0.133117 (-1.89)
$F : \pi_3 = \pi_4 = 0$	33.392** (3.04)	24.402** (3.04)	33.308** (3.04)	24.543** (6.35)	35.856** (6.35)	27.073** (6.35)	36.504** (6.35)	27.562** (6.35)	31.337** (6.35)	36.385** (3.05)
$F : \pi_5 = \pi_6 = 0$	23.773** (3.08)	19.144** (3.08)	25.721** (3.08)	28.235** (6.34)	36.814** (6.37)	32.352** (6.37)	19.723** (6.34)	24.064** (6.37)	23.779** (6.37)	21.880** (3.11)
$F : \pi_7 = \pi_8 = 0$	28.982** (3.14)	15.242** (3.14)	21.473** (3.14)	27.557** (6.30)	22.995** (6.29)	38.366** (6.29)	31.612** (6.30)	28.838** (6.29)	29.328** (6.29)	19.937** (3.16)
$F : \pi_9 = \pi_{10} = 0$	25.15** (3.05)	27.121** (3.05)	34.153** (3.05)	20.727** (6.37)	19.688** (6.36)	27.027** (6.36)	21.261** (6.37)	28.941** (6.36)	29.582** (6.36)	27.547** (3.07)
$F : \pi_{11} = \pi_{12} = 0$	26.61** (3.07)	16.377** (3.07)	6.875** (3.07)	40.35** (6.31)	40.54** (6.31)	28.101** (6.31)	38.28** (6.31)	25.681** (6.31)	33.068** (6.31)	30.991** (3.08)
Auxiliary Regression	C, ND, NT	C, ND, NT	C, ND, NT	C, D, T	C, D, NT	C, D, NT	C, D, T	C, D, NT	C, D, NT	NC, ND, NT

Critical values given by Franses and Hobijn (1997) are in parentheses and ** shows 5% level of significance

At 1st difference

Hypothesis	Pak/China	Pak Germany	Pak India	Pak Indonesia	Pak Japan	Pak Singapore	Pak Malaysia	Pak UK	Pak USA	Pak Spain
$t : \pi_1 = 0$	-0.084503 (-1.87)**	-0.054407 (-3.32)	-0.083520 (-2.76)	-0.107844 (-1.87)	-0.057796 (-1.87)	-0.157239 (-1.87)	-0.084854 (-2.76)	-0.049143 (-2.76)	-0.043532 (-2.76)	-0.057926 (-1.87)
$t : \pi_2 = 0$	-0.078943 (-1.89)	-0.115268 (-2.79)	-0.062433 (-2.79)	-0.070610 (-1.89)	-0.110631 (-1.89)	-0.099534 (-1.89)	-0.102486 (-2.79)	-0.099037 (-2.79)	-0.099286 (-2.79)	-0.069571 (-1.89)
$F : \pi_3 = \pi_4 = 0$	26.81923** (3.05)	21.02515** (6.35)	29.94035** (7.19)	19.89111** (3.05)	34.89580** (3.05)	25.52578** (3.05)	31.27111** (7.19)	23.19231** (7.19)	25.07929** (7.19)	30.58011** (3.05)
$F : \pi_5 = \pi_6 = 0$	19.91553** (3.11)	19.65758** (6.34)	24.83082** (6.37)	20.41301** (3.11)	35.36368** (3.11)	30.22879** (3.11)	16.68505** (6.37)	20.29856** (6.37)	19.39750** (6.37)	21.15861** (3.11)
$F : \pi_7 = \pi_8 = 0$	23.57649** (3.16)	17.42974** (6.30)	21.75821** (6.29)	18.40509** (3.16)	24.13989** (3.16)	35.53350** (3.16)	25.05620** (6.29)	24.64063** (6.29)	23.72587** (6.29)	17.92964** (3.16)
$F : \pi_9 = \pi_{10} = 0$	20.88862** (3.07)	24.54310** (6.37)	30.94849** (6.36)	15.29980** (3.07)	20.78804** (3.07)	25.79733** (3.07)	18.00341** (6.36)	23.09331** (6.36)	23.35615** (6.36)	24.87359** (3.07)
$F : \pi_{11} = \pi_{12} = 0$	22.23898** (3.08)	16.64429** (6.31)	32.09973** (6.31)	26.93838** (3.08)	37.88582** (3.08)	25.62642** (3.08)	29.00952** (6.31)	24.20911** (6.31)	24.50696** (6.31)	27.45391** (3.08)
Auxiliary Regression	NC,ND,NT	C,T,D	C,NT,D	NC,NT,ND	NC,NT,D	NC,NT,ND	C,D,NT	C,D,NT	C,NT,D	NC,ND,NT

Critical values given by Franses and Hobijn(1997) are in parentheses and ** shows 5% level of significance

Zivot Andrews Unit Root Test

COUNTRY	B-date	Prob.	t-stat	1%	5%	10%
PAK-CHINA	1996m05	0.0074(I)*	-3.5968	-5.34	-4.93	-4.58
PAK-GERMANY	2011m04	0.0122(I)*	-3.247	-5.34	-4.93	-4.58
PAK-INDIA	2011m03	0.0034(I)*	-3.221	-5.34	-4.93	-4.58
PAK-INDONESIA	2003m04	0.0038(I)*	-4.3531	-5.34	-4.93	-4.58
PAK-JAPAN	2001m17	0.0639(T)*	-3.16	-4.80	-4.42	-4.11
PAK-MALAYSIA	1993m12	0.422	-4.672	-5.34	-4.93	-4.58
PAK-SINGAPORE	2009m04	0.03(T)*	-4.50	-4.80	-4.42	-4.11
PAK-SPAIN	2004m11	0.62	4.24	-5.34	-4.93	-4.58
PAK-UK	2008m11	2.20	-7.43	-5.34	-4.93	-4.58
PAK-USA	2008m10	0.001(I)*	-4.403	-5.34	-4.93	-4.58

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