



# Estimating Persistent Overvaluation of Real Exchange Rate : A Case of Pakistan

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# Objectives of the study

- To examine the effects of various macroeconomic fundamentals on real exchange rate, and
- To calculate degree of misalignment in real exchange rate from equilibrium exchange rate for a period from 1978 to 2016.



# Exchange Rate & Its Importance

- Exchange rate, the price of foreign currency in terms of local currency, is highly significant relative price having a wide range of macroeconomic implications. It plays a key role in resources allocation in the areas of consumptions, business investment and production as well as it reflects the degree of competitiveness of exports in international markets



# Misalignment in RER

- ❑ The persistent deviation of actual real exchange rate from equilibrium exchange rate is termed as misalignment.
- ❑ Equilibrium RER is estimated as a function of degree of openness, workers' remittances, foreign direct investment, official foreign economic assistance, government spending, terms of trade and real investment in the country.
- ❑ This misalignment may be overvaluation-in which actual RER is appreciated from equilibrium RER while the another is undervaluation-in which actual RER is depreciated from equilibrium RER.



# Significance of the study

- In Pakistan very few attempts have been made to examine the degree of misalignment showing inconclusive results..
- Secondly data of these studies are not latest and during last decade major macroeconomic and financial developments occurred at national and global level so it is imperative to estimate degree of misalignment of real exchange rate of Pakistan with recent data.



# Model Specification

- $RER_t = \alpha + \beta_1 TOT_t + \beta_2 TO_t + \beta_3 WR_t + \beta_4 FDI_t + \beta_5 GC_t + \beta_6 RI_t + \mu_t$
- Where
  - TOT= Terms of trade
  - TO =Trade Openness as proxy of trade policy
  - WR= Workers remittances as % of GDP
  - FDI= Foreign Direct Investment as proxy of capital inflow as % of GDP
  - GC= Government consumption expenditure as % of GDP
  - RI= Real investment % of GDP
  - RER= Real Exchange Rate
  - $\alpha$  = Constant and  $\beta$  = long run parameters
  - Equation transformed into log linear form



# Research Methodology

- 1st step is to check the nature of stationarity of time series by applying unit root test
- 2<sup>nd</sup> step is to analyze long run cointegration by applying Johansen Test of Cointegration
- 3<sup>rd</sup> step is to estimate long run parameters of all fundamentals by applying VECM
- 4<sup>th</sup> step is with the help of magnitude of parameters equilibrium exchange rate at every point of time during 1978 to 2016 will be calculated

# Continued

- 5<sup>th</sup> step is level of misalignment of actual RER from equilibrium RER will be calculated with the help of given equation. The equation calculates misalignment index, and if index is zero it means equilibrium RER and actual RER are same. If it is positive it implies devaluation while actual RER is overvalued in case of negative value of index.
- *Misalignment Index* = 
$$\frac{RER_t - EER_t}{EER_t}$$



# Estimation & Results

	Equation	RER	GC	WR	TOT	TO	RI	FDI
Level	Constant	-2.43	-1.52	-1.70	0.19	-2.15	-1.40	-2.68
	Con.& trend	-0.97	-1.77	-0.87	-1.64	-1.68	-2.29	-2.97
1 <sup>st</sup> .Diff	Constant	-5.46	-5.36	-4.45	-5.20	-5.83	-5.68	-4.19
	Con.& Trend	-6.18	-5.29	-4.84	-5.31	-6.07	-5.71	-4.14

1. Test critical values for constant are -3.62, -2.94 & -2.61 for 1%, 5% & 10%
2. Test critical values for constant & Trend are -4.23, 3.54 & 3.2 for 1%, 5% & 10%

# Johansen Test of Cointegration

## Unrestricted co-integration rank test( Trace Statistics)

Null Hypothesis			
No. of C.E. equations	Trace Statistics	Critical values at 0.05	probability
None*	155.50	125.61	0.002
At most 1*	103.44	95.75	0.013
At most 2*	74.66	69.81	0.019
At most 3*	50.14	47.85	0.030
At most 4*	30.53	29.79	0.041
At most 5	13.81	15.49	0.088
At most 6	2.93	3.84	0.086

1. Test statistics indicates 5 co-integration equations at 0.05 % level
2. \* indicates rejection of Null-hypothesis at 0.05 % level

# Rank Test Maximum Eigen Values

Unrestricted Cointegration Rank Rest( Maximum Eigen values)

Null Hypothesis			
No.of C.E s	Maximum Eigen Statistics	0.05 Critical value	Probablity
None*	52.05	46.23	0.01
At the most 1	28.70	40.07	0.50
At the most 2	24.51	33.87	0.41
At the most 3	19.61	27.58	0.36
At the most 4	16.72	21.13	0.18
At the most 5	10.87	14.26	0.16
At the most 6	2.93	3.84	0.08

Maximum Eigen values indicate 1 cointegration equation

# Long run VECM estimates

Dependent Variable RER		
Explanatory Variables	Coefficients	T-Statistics
TOT	-2.41	-5.16
TO	-1.02	-0.77
WR	-0.70	-4.13
RI	5.39	5.61
GC	-0.82	-4.31
FDI	-0.82	-6.89
Constant	1.03	
Residuals Diagnostic		
Serial Correlation LM test	LM statistics 40.05	Prob-0.81
White Heteroscedasticity Test	Chai sq value-462.34	Prob-0.30
Cholesky Normality Test	JB-value 17.6	Prob-0.22

# Error Correction & Short Run estimates

Dependent Variable $\Delta RER$			
Repressors	Coefficients	T-statistics	P-values
$\Delta RER_{t-1}$	-0.51	3.17	0.016
$\Delta TOT_{t-1}$	-0.68	-3.73	0.026
$\Delta TO_{t-1}$	-0.23	-0.48	0.371
$\Delta WR_{t-1}$	-1.92	-2.55	0.036
$\Delta RI_{t-1}$	0.77	0.87	0.634
$\Delta GC_{t-1}$	0.27	0.31	0.884
$\Delta FDI_{t-1}$	-2.15	-1.07	0.823
$EC_{t-1}$	-0.31	-3.20	0.001

# Equation for Real RER

- *On the basis of VECM estimates we can use following equation for Equilibrium RER*
- $ERER = 1.03 - 2.41 * TOT - 1.02 * TOT - 0.07 * WR + 5.39 * ln - 1.8 * GC - 0.82 FDI$



# Conclusion

- Results of the study suggest that terms of trade, workers' remittances and FDI play major role in variation of real exchange rate as a unit increase in these fundamentals causing an appreciation in RER
- Government consumption leads to depreciation in RER.
- Misalignment in RER has been calculated by misalignment index ,reveal that an increasing trend in overvaluation of actual RER from equilibrium RER exists in period of study except 1986 to 1995



# Conclusion

- overvaluation of 3% in 1979 to around 22% in 2016 has been observed
- The study computed three distinct phases of overvaluation, one is from 1979 with overvaluation is 3% and ending in 1985 which was mainly due to heavy workers' remittances and positive terms of trade
- Second phase of overvaluation 1997 to 2002 when nominal exchange rate was fixed due to economic sanctions on Pakistan which was 10%.

# Continued

- The third phase started in 2003 when heavy flow of funds in terms of FDI, workers' remittances and aid for war against terrorism causing an overvaluation of actual RER by 11% and touching the mark of about 22% till 2016.
- The findings of the study conclude that inflow of capital is the most important factor in real exchange rate and in providing strength to external sector of the country