Theoretical and Applied Economics
Volume XXIX (2022), No. 2(631), Summer, pp. 165-174

Linear and nonlinear effect of exchange rate on inflation in Pakistan

Kashif MUNIR
Al Qasimia University, Sharjah, United Arab Emirates
kshakir@alqasimia.ac.ae

Abstract. *This study analyzes linear and nonlinear impact of exchange rate on inflation in Pakistan. Time series analysis is performed under ARDL and nonlinear ARDL framework to analyze that how in long and short run inflation get affected by exchange rate. Time series data (monthly) of Pakistan from 1980 (January) to 2019 (April) is utilized for analysis. ARDL model shows that real effective exchange rate has negative and significant impact on inflation in the long run, however, nonlinear ARDL (NARDL) model found that exchange rate deprecation increases inflation in long run, while appreciation decreases inflation in long run. The NARDL model proves that exchange rate has nonlinear effects on inflation in Pakistan. One-way causality exists from inflation to exchange rate as well as to appreciation of exchange rate in Pakistan. Government has to formulate policies to stabilize the exchange rate, while strong financial and capital markets are required to minimize risk of exchange rate to protect the international competitiveness.*

Keywords: exchange rate, inflation, ARDL, NARDL, Pakistan.

JEL Classification: C22, E31, F31.

1. Introduction

Continuous increase in prices have always been a serious concern for policy makers in developing economies. It is more adverse when the imported prices cause to increase or decrease the domestic prices. Imported prices lead to fluctuate in the domestic prices due to which the domestic policies become less effective. Policy makers show reluctance to undertake the adjustment of exchange rate, despite the recognition of overvaluation of the prices. Increase in price level undercut the competitiveness that devaluation is designed to achieve. Several developing economies faces the fluctuation in prices which is considered to be dangerous for economic growth and prosperity. Prices started to increase from mid-1970 in Pakistan, while exchange rate shows depreciation continuously from 1980.

Fluctuations in the domestic price level is explained by foreign inflation in less developed economies of Asia (Rana and Dowling, 1985). Therefore, developing countries cannot perform much to control domestic inflation, while developed economies have efficient policies to control inflation as well as influence the developing countries inflation. Generally, monetary expansion is linked with inflation. Price level increase is represented through proliferation of money supply. Exchange rate elasticity is chosen because it socializes devaluation and is less disturbing for the economy. Exchange rate adjustment is considered to be a controversial policy. Fluctuation in exchange rate policy leads to disturbance in income distribution and economy as whole. Various researchers analyzed association among exchange rate and inflation. Dornbusch (1987), Krugman (1986), Knetter (1989), and Choudhary and Khan (2002) showed no association among exchange rate and inflation. Rana and Dowling (1985), Deravi et al. (1995), Choudhri and Hakura (2006), Choudhri et al. (2005), Zorzi et al. (2007), Jaffri (2010), Monfared and Akin (2017), and Musawa and Mwaanga (2017) found positive relation between inflation and exchange rate. However, Wang (2013), Wu and Yu (2017) argued that exchange rate causes domestic prices to fall.

In recent times, the major objective of government policy is to control domestic inflation as well as exchange rate. These policies maintain economic stability and employment in the country without direct intervention of government. Much work is done in this context in developed economies, but there is slight work in Pakistan. This paper fills the gap by providing empirical analysis on the association among inflation and exchange rate. Major goal of this research is to measure linear and nonlinear impact of exchange rate on inflation in Pakistan. Major prominence of this research is to provide better knowledge and understanding to policy makers in evaluating and understanding how exchange rate affects the inflation. This study is useful for government officials and central banks for making the desirable decision in macroeconomic policy to maintain exchange rate fluctuation and economic growth.

Remaining paper is arranged as: Review of literature is discussed in Section 2. Section 3 focused on methodology and data. Section 4 contain findings of linear and nonlinear impact of exchange rate on inflation. Conclusion and policy recommendations are provided in Section 5.

2. Literature review

Pass-through of incomplete exchange rate is explained through industrial organization theory of Dornbusch (1987), Krugman (1986), and Knetter (1989), which argued about no effect on prices of exchange rate. Rana and Dowling (1985) analyzed relationship among inflation and exchange rate in nine Asian under-developed economies. Results depicted that increase in money supply and fluctuation of exchange rate showed no effect on inflation. Krugman (1986) examined the real impact of prices to market by foreign suppliers in Germany through movement in exchange rate. Results depicted that pricing to market is not universal, while the import prices of transport equipment and machinery are sticky. Deravi et al. (1995) examined how exchange rate depreciation impacts price level. Results depicted that inflation rise because of money supply and exchange rate. Moreover, depreciation of dollar lead to increase in the inflation over the last two decades.

Siddiqui and Akhtar (1999) analyzed that how fluctuations in foreign prices affect domestic prices in Pakistan. They found that significant unidirectional and bi-directional association exists among the fluctuation in the domestic prices and exchange rate. Choudhary and Khan (2002) examined linear association of inflation with exchange rate. Results showed that no association exists among inflation and devaluation of rupees. Hyder and Shah (2004) examined exchange rate impact on wholesale and consumer price index in Pakistan. Findings depicted moderate effects on domestic prices of exchange rate. However, exchange rate impacts wholesale prices more than consumer prices.

Choudhri et al. (2005) analyzed exchange rate pass-through on prices under open economy macroeconomic models. Results showed positive association among inflation and exchange rate, while currency policy is used to control the inflation by keeping the inflation at lower levels. Choudhri and Hakura (2006) investigated association among low inflationary pressure and less exchange rate in seventy-one countries from 1979 to 2000. They showed significantly positive association among exchange rate and inflation. Zorzi et al. (2007) analyzed mechanism of pass through of exchange rate to prices in twelve developing economies of Asia, Latin America and various parts of Europe. Positive association among pass through of exchange rate and inflation was found, this also supports Taylor's hypothesis.

Jaffri (2010) examined effects on consumer price index in Pakistan of exchange rate from 1995 to 2009. Results showed that foreign inflation lead to increase in domestic inflation. Wang (2013) examined how exchange rate impacts fluctuations in prices in China from 2005 (July) to 2013 (June). They found that nominal exchange rate and CPI are negatively associated, while ratio of pass through depicts hysteretic behavior. Helali et al. (2014) examined how exchange rate fluctuations impact in long and short run in Tunisia. Results depicted that exchange rate effects prices strongly but not output.

Monfared and Akin (2017) analyzed relationship among inflation and exchange rate in Iran. Findings showed direct proportionality among inflation and exchange rate. Moreover, money supply has positive relation with inflation and inflation only gets affected by money supply but not exchange rate. Musawa and Mwaanga (2017) examined how macroeconomic components and prices of commodities impact stock market. They found

that exchange rate immediately affects stock market and causes price level to increase. Wu and Yu (2017) analyzed effect of fluctuation in Australian dollar- Chinese renminbi exchange rate on consumer price index. Findings showed negative association among consumer price index and Australian dollar-Chinese renminbi.

3. Methodology and data

Fluctuation in exchange rate causes import prices to change which then leads to change domestic prices of goods and services. Bailliu and Fujii (2004), Khundrakpam (2007), and Ghosh and Rajan (2008) proposed theoretical and empirical model to inspect effects on domestic prices of exchange rate pass-through. Following time series model is used to estimate the association among inflation and exchange rate. First model measures linear impact of exchange rate on inflation as:

$$INF = f(REER) \tag{1}$$

Where, INF is inflation, and REER is real effective exchange rate.

Second model examines nonlinear impact of exchange rate on inflation as:

$$INF = f(REER^{+}, REER^{-}) \tag{2}$$

Where, $REER^{+}$and $REER^{-}$ are decomposition of partial sums of variables.

Time series analysis should be deal with proper care otherwise it produce misleading results. For avoiding unit root problem, PP and ADF tests are used. Dickey and Fuller (1981) described the "Dickey Fuller (DF)" unit root test assumes that error term is uncorrelated. Augmented Dicky Fuller (ADF) test is used when there is problem of serial correlation and Dickey Fuller unit root test is augmented via considering the lag of dependent variable. To avoid the problem of serial correlation, Phillips and Perron (1988) does not add the lag of dependent variable, while it uses the non-parametric statistical method to resolve the issue.

Cointegration among variables can be checked through different techniques (Johansen and Juselius, 1990; Engle and Granger, 1987). Pesaran et al. (2001) proposed "Autoregressive Distributive Lag (ARDL)" model in which variables have mixed integration order. ARDL bound test have two assumptions such as no variable is integrated of I(2), while regressand must be integrated of order I(1). ARDL bound technique is much better than other approaches because pre-testing is not necessary. However, adjustment in short run is depicted by error correction term (ECT) with long run specification of ARDL model with the simple linear transformation:

$$\Delta \ln Y_t = C + \sum_{i=1}^{p} \alpha_i \, \Delta \ln Y_{t-i} + \sum_{i=1}^{p} \beta_i \, \Delta \ln X_{t-i} + \varphi_1 \ln Y_{t-1} + +\varphi_2 \ln X_{t-1} + \varepsilon_t \tag{3}$$

Where, α and β represent the dynamics of short run coefficients, long run coefficients are represented by φ1 and φ2 which depicts the marginal changes in dependent variable caused by fluctuations in independent variables, and first difference of the variable is represented by Δ. Following null hypothesis is used to check cointegration:

H_0: $\varphi_1 = \varphi_2 = 0$ (No cointegration)

H_1: $\varphi_1 = \varphi_2 \neq 0$ (Cointegration)

Null hypothesis should be rejected if F-statistics is more than the upper bound value, while accepted if the value of F-statistics falls below the lower bound values. If value lies among the upper and lower values then results would be indecisive. Dynamics of short run are measured by converting the ARDL model into "ECM (Error Correction Model)". ECT explains adjustment rate of variables towards equilibrium and convergence in short run by a negative sign.

Nonlinear ARDL (NARDL) model explained by Shin et al. (2014) based on Pesaran and Shin (1999), and Pesaran et al. (2001) linear ARDL model. Granger and Yoon (2002) and Schroedert (2003) methodology was adopted by Shin et al. (2014) to decompose a stationary variable into different variations i.e. positive and negative. So, two components for variable x, partial sum of variables are:

$$x^+ = \sum_{j=1}^{t} \Delta x_j^+ = \sum_{j=1}^{t} \max(\Delta x_j, 0) \quad (4)$$

$$x^- = \sum_{j=1}^{t} \Delta x_j^- = \sum_{j=1}^{t} \min(\Delta x_j, 0) \quad (5)$$

Long run relation of y and x in a nonlinear structure is as follows:

$$y_t = \beta^+ x_t^+ + \beta^- x_t^- + \mu_t \quad (6)$$

$$x_t = x_0 + x_t^+ + x_t^- \quad (7)$$

Where, β^+ and β^- are long run parameters, and $x^+$and x^- are scalars of decomposition partial sums. NARDL models can be specified for two variables as:

$$\Delta y_t = \rho y_{t-1} + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \sum_{j=1}^{p} \emptyset_j \Delta y_{t-j} + \sum_{j=0}^{q} \left(n_j^+ \Delta x_{t-j}^+ + n_j^- \Delta x_{t-j}^- \right) + \varepsilon_t \quad (8)$$

The asymmetric changes in the component of x are given by:

$$m_h^+ = \sum_{j=0}^{h} \frac{\partial y_{t+j}}{\partial x_t^+} \;\&\; m_h^- = \sum_{j=0}^{h} \frac{\partial y_{t+j}}{\partial x_t^-} \quad (9)$$

ARDL bound test determines long run relation of variables but direction of causality is not provided. Causality is determined through Granger causality test. Granger (1988) said that framework of ECM can be used to determine causal association among variables. Coefficients of lagged term captures dynamics of short run and error correction term has information of causality of long run.

Monthly time series data of Pakistan from January 1980 to April 2019 is utilized for analysis. Data of real effective exchange rate and inflation is taken from Pakistan Economic Survey (various issues). Both the variables are converted into standardize unit for a meaningful comparison.

4. Results

PP and ADF tests result are stated in Table 1. ADF test shows that inflation and exchange rate are integrated of order one. Phillip-Perron (PP) unit root test is used to confirm the results of ADF test and shows that both variables are I(0).

Table 1. *Unit Root Tests Result*

Var	ADF Test		PP Test		Results	
	I(0)	I(1)	I(0)	I(1)	ADF	PP
Inflation	-1.9986	-10.9782***	-3.2122**	-19.4500***	I(1)	I(0)
Exchange Rate	-1.9149	-14.8456***	-1.8143*	-14.7544***	I(1)	I(0)

Note: ***, **, * shows significance at 1%, 5% and 10% level respectively.

ARDL bound test is used to find the long run association among the variables. Bound test is applied on both the models and Table 2 reports results. Lag length criterion is based on SIC. Lower and upper bound values is compared with F-statistics (Pesaran et al., 2001). Bound test results depict that F-statistics is greater than upper bound at 1 percent level of significance which shows rejection of null hypothesis in both the models.

Table 2. *Results of Bound Test*

Dependent Variable: Inflation	F-Statistics	1 % critical values Bound Test		Co-integration Exist
ARDL Model				
Model		I(0)	I(1)	
$F_{(Inf \mid REER)}(4, 1)$	10.0048	6.56	7.3	Yes
NARDL Model				
F(Inf |REER+, REER-) (4, 1, 0)	10.2778	4.19	5.06	Yes

Serial correlation and model specification tests are used to escape from deceptive results. Before estimating the short and long run parameters, Ramsey Reset test and Breusch-Godfrey LM tests for misspecification problem and serial correlation are applied. Diagnostic tests results are shown in Table 3 and indicates that ARDL and NARDL models have no misspecification or serial correlation problem.

Table 3. *Results of diagnostic tests*

Model	Diagnostic Test	F-statistics (p-value)	Results
ARDL Model	Breusch-Godfrey LM Test for Serial Correlation:	1.4226 (0.2422)	No Serial Correlation exists
	Ramsey Reset Test for Model Specifications:	0.40094 (0.6887)	No Misspecification Error
NARDL Model	Breusch-Godfrey LM Test for Serial Correlation:	2.1677 (0.1156)	No Serial Correlation exists
	Ramsey Reset Test for Model Specifications:	0.4891 (0.4847)	No Misspecification Error

Long run and short run parameters are estimated after applying the diagnostic tests as suggested by Pesaran et al. (2001). Long run and short run dynamics of ARDL and NARDL model are reported in Table 4 panel A and B respectively.

Table 4. *Long run and short run dynamics*

Dependent Variable Inflation		
	ARDL Model	NARDL Model
Panel A: Long Run		
REER	-0.5769* (0.3388)	-
$REER^{+}$	-	-3.1306*** (0.9536)

Dependent Variable Inflation		
	ARDL Model	NARDL Model
REER-	-	0.7842*** (0.2668)
Panel B: Short Run ECM		
ECT(-1)	-0.0463*** (0.0103)	-0.0617*** (0.0110)

***, **, * shows significance at 1%, 5% and 10% respectively.
Note: Standard errors are in parenthesis.

Negative and significant impact of real effective exchange rate exists on inflation in the long run in ARDL model. It indicates that appreciation of exchange rate reduces domestic inflation. These results are consistent with exchange rate deprecation and increase in domestic prices of Rana and Dowling (1985), Deravi et al. (1995), Choudhri and Hakura (2006), Choudhri et al. (2005), Zorzi et al. (2007), Jaffri (2010), Monfared and Akin (2017), and Musawa and Mwaanga (2017). Exchange rate is negatively related with extremely high inflation rate, while favorable exchange rate is linked with low inflation rate for a country. Interest rate have direct association with inflation that influences the exchange rate of the country. Increased consumption level and economic growth is directly proportional to the low level of interest rate due to which currency value increases. When demand increases due to increase in consumption then it eventually lead to increase in inflation. Foreign investment is attracted by high interest rate which tend to increase the fluctuation in the demand for currency.

However, nonlinear ARDL (NARDL) model shows that variable representing positive partial sum (REER+) representing appreciation carries a significantly negative coefficient and implies that appreciation is associated with decrease in domestic prices in long run in Pakistan. Negative sum of real effective exchange rate (REER-) representing depreciation is significantly and positively associated with domestic inflation in Pakistan. The NARDL model shows that exchange rate has nonlinear impact on inflation. Linear ARDL model leads to misleading results, while NARDL shows that exchange rate nonlinearly affected inflation in Pakistan. A country with stable exchange rate leads to higher economic growth and prosperity.

Figure 1. *CUSUM Test of ARDL*

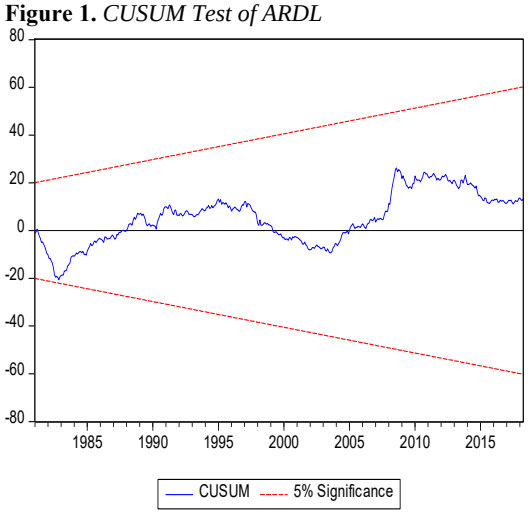
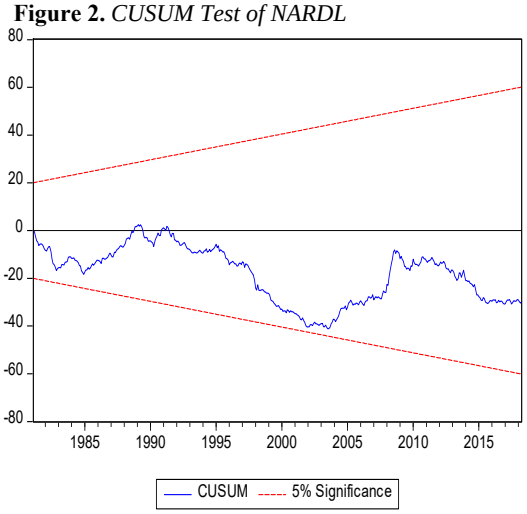


Figure 2. *CUSUM Test of NARDL*



Dynamics of short run is measured by error correction term. ECT explains adjustment rate of variables towards equilibrium and convergence in short run by a negative sign. Table 4 panel B reports the dynamics of short run. ECT term in both models is significant and negative in short run, hence convergence exists. CUSUM test measures the stability of parameters of both ARDL and NARDL model. Figures 1 and 2 shows the CUSUM test of ARDL and NARDL model respectively and shows that both the models are stable. Results of causality test are shown in Table 5. In short run, one-way causality exists from inflation to exchange rate and positive partial sum of exchange rate exchange rate.

Table 5. *Results of causality test*

Model	F-Statistics	Causality
Inflation ➔ Exchange Rate	3.1388*	Yes
Exchange Rate ➔ Inflation	1.1298	No
Inflation ➔ Positive Exchange Rate	6.2659**	Yes
Positive Exchange Rate ➔ Inflation	0.2389	No
Inflation ➔ Negative Exchange Rate	0.5909	No
Negative Exchange Rate ➔ Inflation	0.0064	No

Note: ** and *** shows significance at 5% and 1% level respectrively.

5. Conclusion

Policy makers in developing countries face severe problems to manage imported inflation. Fluctuation of exchange rate increases or decreases domestic prices. This study analyzes linear and nonlinear impact of exchange rate on inflation in Pakistan. Time series analysis is performed under ARDL and nonlinear ARDL framework to analyze long and short run impact. Time series data (monthly) of Pakistan from 1980 (January) to 2019 (April) is utilized for analysis. The major rationale of this research is to provide better understanding to policy makers in evaluating and understanding how exchange rate affects the inflation.

Results of ARDL model in long run showed that real effective exchange rate has negative and significant impact on inflation and indicates that exchange rate appreciation decreases domestic inflation. Results of NARDL model shows that in long run, deprecation increases inflation, while appreciation is negatively and significantly related with inflation. The NARDL model proves that exchange rate has nonlinear impact on inflation in Pakistan. Stable exchange rate increases economic growth and prosperity in a country. One-way causality exists from inflation to exchange rate and positive partial sum of exchange rate exchange rate in Pakistan.

Following policy recommendations are advocated on the basis of above results: firstly, government has to formulate policies for exchange rate stability. Secondly, strong capital and financial markets are required to reduce risk of exchange rate as well as to protect the international competitiveness.

References

Bailliu, J. and Fujii, E., 2004. Exchange Rate Pass-Through and the Inflation Environment in Industrialized Countries: An Empirical Investigation, Working Paper No. 21, Bank of Canada.

Choudhri, E.U. and Hakura, D.S., 2006. Exchange Rate Pass Through Domestic Prices: Does the Inflationary Enviornment Matter? *Journal of International Money and Finance*, Vol. 25, No. 4, pp. 614-639.

Choudhri, E.U. and Khan, M.S., 2002. The Exchange Rate and Consumer Prices in Pakistan: Is Rupee Devaluation Inflationary? *Pakistan Development Review,* Vol. 41, No. 2, pp. 107-120.

Choudhri, E.U., Faruqee, H. and Hakura, D.S., 2005. Explaining the Exchange Rate Pass-through in Different Prices, *Journal of International Economics*, Vol. 65, No. 2, pp. 349-374.

Deravi, K., Gregorowicz, P. and Hegji, C.E., 1995. Exchange Rates and the Inflation Rate, *Quarterly Journal of Buisness and Economics*, Vol. 34, No. 1, pp. 42-54.

Dickey, D.A. and Fuller, W.A., 1981. Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root, *Econometrica*, Vol. 49, No. 4, pp. 1057-1072.

Dornbusch, R., 1987. Exchange Rates and Prices, *American Economic Review*, Vol. 77, No. 1, pp. 93-106.

Engle, R.F. and Granger, C.W.J., 1987. Co-integration and error correction: Representation, estimation and testing, *Econometrica*, Vol. 55, No. 2, pp. 251-276.

Ghosh, A. and Rajan, R.S., 2008. Exchange Rate Pass-through in Korea and Thailand: Trends and Determinants, *Japan and the World Economy*, Vol. 21, No. 1, pp. 55-70.

Granger, C.W., 1988. Causality, cointegration and control, *Journal of Economic Dynamics and Control*, Vol. 12, No. 2-3, pp. 551-559.

Granger, C.W. and Yoon, G., 2002. Hidden Cointegration, Economics Working Paper No. 2002-02, University of California.

Helali, K., Kalai, M. and Boujelben, T., 2014. Exchange rate Pass-Through to Domestic Price in Tunisia: A Short and Long Run Analysis, MPRA Working Paper No. 62204.

Hyder, Z. and Shah, S., 2004. Exchange Rate Pass-Through to Domestic Prices in Pakistan, Working Paper No. 5, State Bank of Pakistan.

Jaffri, A.A., 2010. Exchange Rate Pass-through to Consumer Prices in Pakistan: Does Misalignment Matter? *Pakistan Development Review*, Vol. 49, No. 1, pp. 19-35.

Johansen, S. and Juselius, K., 1990. Maximum likelihood estimation and inference on cointegration-with applications to the demand for money, *Oxford Bulletin of Economics and Statistics*, Vol. 52, No. 2, pp. 169-210.

Khundrakpam, J.K., 2007. Economic Reforms and Exchange Rate Pass-Through to Domestic Prices in India, Working Paper No. 225, Bank for International Settlements.

Knetter, M.M., 1989. Price Discrimination by U.S. and German Exporters, *American Economic Review*, Vol. 79, No. 1, pp. 198-210.

Krugman, P., 1986. Pricing to Market When the Exchange Rate Changes, NBER Working Paper No. 1926, National Bureau of Economic Research.

Monfared, S.S. and Akin, F., 2017. The Relationship Between Exchange Rates and Inflation: The Case of Iran, *European Journal of Sustainable Development*, Vol. 6, No. 4, pp. 329-340.

Musawa, N. and Mwaanga, C., 2017. The Impact of Commodity Prices, Interest Rate and Exchange Rate on Stock Market Performance: Evidence from Zambia, *Journal of Financial Risk Management*, Vol. 6, No. 3, pp. 300-313.

Pesaran, M.H. and Shin, Y., 1999. An Autoregressive Distributed-Lag Modelling Approach to Cointegration Analysis. In S. Strom (Ed.), *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium* (pp. 371-413), Cambridge University Press.

Pesaran, M.H., Shin, Y. and Smith, R.J., 2001. Bounds testing approaches to the analysis of level relationships, *Journal of Applied Econometrics*, Vol. 16, No. 3, pp. 289-326.

Philips, P.C.B. and Perron, P., 1998. Testing for Unit Root in Time Series Regression, *Biometrica*, Vol. 75, No. 2, pp. 335-346.

Rana, P.B. and Dowling, J.M., 1985. Inflationary Effects of Small but Continuous Changes in Effective Exchange Rates: Nine Asian LDCs, *Review of Economics and Statistics*, Vol. 67, No. 3, pp. 496-500.

Schorderet, Y., 2003. Asymmetric Cointegration, Working Paper No. 2003.01, University of Geneva.

Shin, Y., Yu, B. and Greenwood-Nimmo, M., 2014. Modelling Asymmetric Cointegration and Dynamic Multipliers in a Nonlinear ARDL Framework, In W. Horrace, and R. Sickles (Eds.), *The Festschrift in Honor of Peter Schmidt: Econometric Methods and Applications,* pp. 281-314, Springer.

Siddiqui, R. and Akhtar, N., 1999. The Impact of Changes in Exchange Rate on Prices: A Case Study of Pakistan, *Pakistan Development Review*, Vol. 38, No. 4, pp. 1059-1066.

Wang, Y., 2013. Impact of Exchange Rate Changes on Inflation: Case of China. Available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.847.8906&rep=rep1&type=pdf>

Wu, M. and Yu, Y., 2017. The Impact of Australian Consumer Price Index on the Exchange Rate of Australian Dollar-Chinese Renminbi, *European Scientific Journal*, Vol. 13, No. 22, pp. 1857-7881.

Zorzi, M.C., Hahn, E. and Sanchez, M., 2007. Exchange rate Pass Through in Emerging Markets, Working Paper No. 739, European Central Bank.