Turkish Economic Review

www.kspjournals.org

Volume 6 September 2019 Issue 3

Regional trade and macroeconomic indicators in Pakistan: A cointegration analysis

By **Kewal R. TALREJA** [a†]
Naveed A. SHAIKH [b], **& Parveen SHAH** [c]

Abstract. This paper empirically estimates the relationship among selected variables trade, agricultural value-added foreign direct investments, domestic credit to private sectors, official exchange rate and gross capital formation, and population, for the particular Southeast Asian economies including Pakistan, China, Malaysia, India, and South Korea during 1985-2016. Using autoregressive distributed lag model (ARDL) approach, this study statistically proved the presence of long time association among national credit to private zones, foreign direct investment, population, in addition to gross capital formation for the selected Southeast Asian countries. This study further shows gross capital formation significantly contributes during the long and short period towards trade. Albeit, national credit to private sectors, overseas direct investment, and population maintain a supportive relationship with trade but they are not found to be significant. Furthermore, agricultural value-added and the official exchange rate uphold a non-supportive relationship with the trade. The official exchange rate has a negative but insignificant relationship during the long period however all through the short period has an encouraging and significant association with trade. Whereas agricultural value-added maintains significant negative undesirable relationship through the trade throughout the long and short-run. The strategy implication is that selected countries need to focus on outlays on the addition of fixed assets that consist of machinery, land improvement, structure of roads, railways and drains, stable and profitable industrial buildings, schools, hospitals, universities and work in progress that would help in attracting the FDI in economies to boost the trade.

Keywords. Trade, Cointegration, Variables, Growth, Short and long-run.
JEL. F35, G10, G11, G15.

1. Introduction

The development and growth procedures of a motherland relate to trade. Since the eighties decades, the selected Southeast Asian countries have been focusing on the liberalization of trade rather than promoting import substitute industries. With respect to time, various economists suggested different concepts to define the trade. Adam Smith defined trade by absolute advantage also by the division of labor. David Ricardo explained countries develop by growth in trade through

[a†] Department of Economics, Shah Abdul Latif University Khairpur Mirs, Pakistan.
☎. +0243-9280061-62 ✉. krtalreja.kr@gmail.com
[b] Department of Economics, Shah Abdul Latif University Khairpur Mirs, Pakistan.
☎. +0243-9280061-62 ✉. naveed.shaikh@salu.edu.pk
[c] Vice Chancellor, Shah Abdul Latif University Khairpur Mirs, Pakistan.
☎. +92-243-928-0050 ✉. vc@salu.edu.pk

comparative advantage. Marshall (1879) considered the supply of goods as a base for trade theory. Mill during (1848) reflected both demand and supply factors along with the elasticity of demand to define normal traded goods. Heckscher Ohlin and Samuelson seeing the different resource endowments of countries gave detail for trade. Linder (1961) gave the detail that trade is the result of an aggregate demand for goods that affects the increase in per capita income. New trade theory emphasized on monopolistic race, overseas investment and intermediary goods are base of trade.

This study keeping in view the said factors set objectives to explore the factors that cointegrate with trade and remain responsible for the slow growth of trade.

2. Literature review

Khalid *et al.,* (2017) found the remarkable and significant influence of gross capital formation interaction over free trade and economic progress. Foreign direct investment fills up the investment gap that further boosts up the trade and growth (Epaphra, 2016). "Domestic investment contributes significantly to economic growth both in the short-run and long-run" (Sultan & Haque, 2011). FDI has also substituted as well as a complement for trade and bidirectional causal connection exists in the middle of FDI and exchange rate (Kamal *et al.,* 2014). A rise in fixed investment leads to rising capital exports whereas, the real interchange rate has an unimportant impact on exports (Khan, 2013). The study by (Osuna, 2016) has suggested that the private sector has the availability of more funds with increased financial institutions, as a result, more credit is available to listed 327 manufacturing firms in Pakistan at a decreased lending rate. The Population has an insignificant association with bilateral trade value while transport cost, GDP, price rises, exchange rate, and country mile have significant relation with trade (Subhani & Kumar, 2009). In the long run provision of funds increases, assets and economic development and free trade have an important influence usually during the short and long run (Khan & Qayoom, 2006). Borrowing of government from commercial banks and making expenditure in Sri Lanka has a progressive and an important influence over financial development (Rathanasiri & Wijesinghe, 2012). In Tanzania abroad investment, human capital formation, foreign income, household final consumption outlay, natural resources availability, government outlay and Price rises, have a major influence directly over the balance of trade (Shawa & Shen, 2013). The holding of liquid assets has a positive association with trade credits (Vaidya, 2011).

According to the South-South trade as well as liberalistic theories, the progress of developing nations deeply associates with the increased individual sizes of trade. Pakistan including China, Malaysia, India, and South Korea economic growth relate and believe in extra growth trade rates.

2. Model specification and methodology

ARDL has got much more importance and attention to find cointegration. ARDL model one can use to observe cointegration when included variables have dissimilar order one I(0) or the other or I(1). ARDL outcomes are reliable plus successful. Error Correction model (ECM) provides short period values with long-period balance. ARDL outcomes remain worthless and immaterial once variable series became stationary following to I(2) or differencing twice. So the UR test is performed to see in what way series stands stationary next to differencing (Nkoro, 2016).

Therefore by applying the ARDL cointegration procedure, this study set a target to estimate the cointegration relationship of trade with model proposed variables that include gross capital formation (GCF), exchange rate, FDI inflow, agrarian value-added (AVA), national credit to private sectors (DCPS), and population, and The long-run trade model of this study is as under that study aims to estimate.

$$Trd_t = f(GCF_t, FDI_t, POP_t, DCPS_t, AVA_t, OER_t) \quad (1)$$

Where Trd_t is trade value calculated by adding export and import in time t, GCF is gross capital formation this study takes as a substitute for domestic investment, FDI is foreign direct investments inflows, Pop is population over time, AVA is agricultural value-added, and OER is the official exchange rate.

This cross-sectional panel data set is in million and trillion and to make the data become simpler in readable form, to see the clear pattern in data and to fulfill the assumptions of OLS the BLUE (Best Linear Unbiased Estimator), this study uses log form of data. Kogid *et al.*, (2010) Sultan & Haque (2011), Support this study for using a log form of data.

$$LnTrd_t = \psi_0 + \psi_1 lnGCF_t + \psi_2 lnFDI_t + \psi_3 lnPOP_t + \psi_4 lnDCPS_t + \psi_5 ln\ AVA_t + \psi_6 lnOER_t + \epsilon_t \quad (2)$$

Ln is indicating the natural logarithm form of all model defined variables and ϵ_t is telling about error term being white noise with constant mean, variance, and covariance time-invariant. The ϵ_t is signifying the expected effect of omitted variables that this study has not included in the model.

This study for the period 1985-2016 selects panel data from reliable sources of world development indicators and selects the ARDL cointegration approach while following the Nkoro (2016), for analysis purposes.

4. Results and discussion

4.1. Unit root analysis

However, the ARDL model does not require the pretest of unit root but ARDL model crashes if I(2) variable is present, so this study strictly follows to perform unit root to avoid from spurious and meaningless results.

Table 1. *Unit root test Results as per Augmented Dickey-Fuller (ADF) Test*

Variable	At base			After First difference			Decision
	Intercept	Intercept and Trend	None	Intercept	Intercept and Trend	None	
LnTRD	-2.1047	-2.7663	0.63974	-9.2088	-9.1980	-11.7223	I(1)
LnFDI	-2.5978	-3.1804	0.3085	-10.2328	-11.2154	-11.2469	I(1)
LnGCF	-2.7314	-2.6218	0.28683	-9.6535	-9.6716	-9.6715	I(1)
LnPOP	-1.2183	-1.648	-0.56368	-9.8789	-9.9424	-9.9004	I(1)
LnOER	-2.0703	-2.157	-1.3703	-9.7985	-9.6718	-8.1138	I(1)
LnAVA	-2.2707	-2.5018	0.10076	-9.8242	-9.9454	-9.8482	I(1)
LnDCPS	-1.9467	-2.1211	-0.44089	-8.3495	-8.2346	-8.1705	I(1)
Critical values at 5%	-2.879	-3.438	-1.950	-2.879	-3.438	-1.95	

Table 1 shows the ADF test outcomes. Entirely three ADF test results everywhere at unavoidable intercept and around intercept in addition to trend, and at none level with no intercept and no trend have found that all predictors have unit root at level form because calculated ADF values exceed the critical region values at 5 % significance level, causes to accept null hypothesis that data is non stationary. While ADF calculated the first difference I (1) values are lesser than tabulated upper and lower bound values at 95 % confidence interval, cancel the $H_{0:}$ and favors the $H_{1:}$ that data is non-stochastic.

4.2. Appropriate Lag choice

A distributed lag model like $Y_t = \beta_0 + \beta_1 Xt + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \mu_t$ is having great importance in explaining the dependent variable response to the independent variable that is not instant, but with the interval of time. That lapse of time is known as lag.

Table 2. *Lag selection Standard by vector autoregressive model*

Order	LL	AIC	SBC	LR test	Adjusted LR test
8	250.7268	-142.2733	-735.9538		
7	219.5361	-124.4639	-643.0593	CHSQ(49)= 63.3814[.095]	38.3989[.834]
6	191.9312	-102.0688	-546.5792	CHSQ(98)= 117.5915[.087]	74.2684[.964]
5	171.5683	-73.4315	-443.8571	CHSQ(147)= 158.3172[.247]	99.9897[.998]
4	150.3032	-45.6968	-342.0373	CHSQ(196)= 200.8476[.391]	126.8512[1.01]
3	129.5481	-17.4516	-239.7068	CHSQ(245)= 242.3573[.536]	153.0677[1.00]
2	107.8118	9.8118	-138.3583	CHSQ(294)= 285.8298[.623]	180.5242[1.00]
1	86.5123	37.5123	-36.5726	CHSQ(343)= 328.4292[.705]	207.4289[1.00]
0	-1645.4	-1645.4	-1645.4	CHSQ(393)= 3794.3[.000]	2395.1[.000]

The system equation lag model is presented in Table 2 by selecting eight lags in the VAR model. The VAR model has chosen 0 lag at a lower AIC value order for the list of study variables. According to thumb rule that

AIC lower value with high R^2, the ARDL model remains good. This study has found interesting results that all SBC, AIC, and LL standards calculated the same lower number -1645.4 at 0 lag order and chi-square fact and figures relating to LR test as well as LR test adjusted value at 0 lag stands merely no table.

4.3. Projected ARDL outcomes and Expected Autoregressive lag selection by SBIC

The ARDL estimated coefficients as per Table 3 demonstrates that keeping trade as a dependent variable all variables along with intercept seem to become significant contributors towards trade at a 5 % significance level.

Table 3. *Proposed ARDL and expected ARDL Lags (1, 1, 1, 0, 1, 1, and 0) agreeing to Schwarz Bayesian Standard*

Control variable β value	Standard Error	T-Ratio [Prob:]
LNPOP	-.243234	.032403 -8.7066[.001]
LNPOP(-1)	.25862	.030556 9.6638[.002]
LNOER	.14766	.024586 7.2054[.001]
LNOER(-1)	-.15098	.025001-7.1396[.000]
LNGCF	.039468	.0183223.2545[.034]
LNFDI	.037539	.010702 4.6073[.002]
LNFDI(-1)	-.029868	.010385 -3.9756[.004]
LNDCPS	.31832	.049739 7.5008[.001]
LNDCPS(-1)	-.29936	.049917-6.8968[.002]
LNAVA	-.098447	.026388 -4.8304[.001]
INPT	1.2896	.320804.8083[.002]

4.4. Model summary

The Model summary tells about R^2 ratio of variance in controlled variable, adjusted r^2 importance of variables, DW test autocorrelation and F statistics is telling about fitness of the model.

Table 4. *Model Summary*

R^2	Adjusted R^2	DW- Test statistics	F- statistics
0.97676	0.97577	1.8097	0.001

The Model conclusion as per Table 4 explains the proportion of change in the regress and is 98.6% keeping all other absent variables constant equal near zero. The change in the middle of R^2 and adjusted r^2 Square stay minor 0.00099, telling that model included variables are good. Low DW test value with high R^2 permits for cointegration also, as negative R^2 with high DW value, restricts for cointegration. DW test supposes series has unit root because the DW test in autoregressive model computes d statistics nearby two 2, even though error terms serially correlate that's why it remains only limited to the first-order autocorrelation and it does not stand trustworthy to test serial correlation for dynamic ARDL model. So, this study will apply

the LM test for serial correlation analysis. The F statistics is significant and confirms that the model seems suitable for testing of hypothesis.

4.5. Diagnostics tests

Diagnostic Stability of the model test this study performs to see the fitness of model.

Table 5. *Analytical tests*

Test Information*	LM Version	F Version
Serial Correlation	CHSQ(1) = 1.8348[.186]	F(1,145) = 1.7104[.207]
Ramsey Reset	CHSQ(1) = .014319[.906]	F(1,147) = .013148[.908]
Heteroscedasticity	CHSQ(1) = .32898[.567]	F(1,158) = .32551[.568]

The Table 5 reveals the results of the essential analytical test. Breusch Godfrey serial correlation F version LM test calculated value remains 0.207 that is less than critical value 1.7104, LM modified version calculated value 0.186 is also less than critical value 1.8348 and we accept null theory there remains no first-order autocorrelation and ensure error terms don't correlate and estimated coefficients stay unbiased and consistent. The Ramsey Reset test discloses no significant nonlinear link in the regression model as phi cap is considered to be zero $\widehat{\Phi} = 0$ because the p-value is insignificant leads null hypothesis fails to be rejected. Taking place the base of regression of squared residuals on squared close-fitting values (Breusch Pagan Godfrey test) has observed data is homoscedastic and this study accepts the null hypothesis of constant variance because chi-square p-value stays unimportant at 95 confidence interval.

4.6. Bound test of cointegration

After all, the Bound test investigates the existence of cointegration amongst model suggested variables.

Table 6. *Bound cointegration and W – Statistics Test Results*

F – Statistic	95 %		90 %	
	lower bound	Upper bound	lower bound	Upper bound
2.9943	2..5247	3.7367	2.1763	3.2811
W – Statistic				
20.3594	17.6732	26.1566	15.2341	22.9680

According to table no: 6 Bound as well as W – statistics values at 95 % confidence interval place in the middle of higher and lesser bound values and decision about cointegration presence seems unsettled, so concluding decision regarding existence of cointegration this study will decide by ECM value and here assumes cointegration and adopts restricted Vector Error Correction Model (VECM) to analyse short and long term results.

4.7. Long run estimates

Table 7 is showing long-time encouraging association among domestic credit to private sectors (DCPS), population (Pop:) Foreign direct investment (FDI), and gross capital formation (GCF).

Table 7. *Long Run Measurements of ARDL (1, 1, 1, 0, 1, 1, and 0) and regressand (LnTRD)*

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
intercept	17.4566	6.3559	3.1732	0.001
LNFDI	0.20608	0.25690	0.82223	0.480
LNGCF	0.54597	0.17263	2.2026	0.046
LNPOP	0.21307	0.35474	0.60061	0.568
LNOER	- 0.46228	0.20062	- 23042	0.827
LNAVA	- 1.3619	0.67401	- 2.0206	0.044
LNDCPS	0.26234	0.39830	0.65862	0.510

The GCF's contribution to rising trade remains positive and important. Telling that a one percent rise in GCF brings change in trade to rise by 0.545 percent on an average. However FDI, (Pop:), (DCPS) all through the long run maintains the positive but immaterial association by trade. While official interchange rate (OER :) and agrarian value-added (AVA) and maintain the non-supportive negative association with the trade. Although (AVA) upholds a substantial negative relationship with trade, nonetheless (OER) keeps an insignificant negative relationship using the trade.

4.7.1. Error Correction Model (ECM)

Table 8 presents the (ECM) re-estimated results without affecting long period results. Gross capital formation (GCF), official exchange rate (OER), foreign direct investment (FDI), and domestic credit to private sectors (DCPS) maintain a positive and important association with trade.

Table 8. *Error Correction Representation for the ARDL Model (1,1, 1, 0, 1, 1, 0) and regress and D (LnTRD)*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM (-1)	-0.072292	0.035427	-2.2404	0.042
DLNFDI	0.037538	0.020702	3.5071	0.002
DLNGCF	0.039468	0.018329	2.1543	0.032
DLNPOP	-0.24324	0.032401	-7.6066	0.001
DLNOER	0.14766	0.024586	6.0052	0.001
DLNAVA	-0.098447	0.026388	- 3.8304	0.001
DLNDCPS	0.31832	0.049739	6.4008	0.000

It purports that if a 1 % increase in FDI, GCF, OER & DCPS is caused, in response to that trade will rise by 0.037, 0.039, 0.147 and 0.318 % respectively during the short run. However, Population (POP) and (AVA) maintain a negative notable relationship with the trade. ECM significant negative value -0.072292 with p-value 0.042 shows variables ability for reversing to long-run balance. It proves statistically and determines the existence of cointegration surrounded by proposed variables and leave the null theory of no causality hereby. Due to any reason the trade moves away

from its initial equilibrium point, it will adjust near by 7.22 % during the current time and furthermore in the following years among the particular Southeast Asian countries.

5. Conclusion

This study has used panel data for the period 1985-2016, and made an attempt to estimate the relationship between trade, domestic credit to private sectors (DCPS), official exchange rate (OER:), agricultural value-added (AVA), foreign direct investments (FDI), population, and gross capital formation (GCF) for the particular countries comprising Pakistan, China, Malaysia, South Korea, and India. Initially, we have seen all variables become stationary I(0) at first difference. Later on, the ARDL cointegration approach along with the ECM model was applied to see cointegration and long-term association among model independent variables. This study has checked serial correlation, model specification and Heteroscedasticity using LM, Ramsey Reset, and Breusch Pagan and Cusum test Bound Cointegration test was applied to see the cointegration but results were inconclusive and cointegration decision was determined by ECM significant negative value. The long-run association exists among Gross capital formation, domestic credit toward private sectors, population, and foreign direct investment.

Gross capital formation contribution toward trade remains significant throughout long and the short run. Though, overseas investment does not support the modern theory of trade. Domestic credit to the private sector relationship by trade is minor supportive during the long period.

The official exchange rate maintains a negative discouraging relationship throughout a long period while all through a short period maintains a positive and encouraging association with trade. Meaning that Marshall Lerner condition does not occur and currency devaluation is not an ultimate permanent solution to boost trade. Whereas, agricultural value-added maintain a major negative association by the trade throughout the long and short run. So we reject the hypothesis that the rise in agricultural value addition support trade.

This study catches the attention of selected countries policymakers and recommends that they should fame the trade policies in the light of stable exchange rate, stable price, physical and human capital expenditure, to improve secondary and finished goods export.

Improved and sophisticated methods of production, high yield variety crop, hybrid seeds, training to farmers and proper allocation of misused, unutilized or underutilized land can raise the marginal product of land and labor. It will help to keep the agricultural sector as an important contributor towards trade.

These countries need to provide loans and credits at a nominal interest rate to industries for the procurement of land, technology, and gadgets capital goods, for the production of goods and services to increase trade.

References

Ahmad, N., Nazir, M.S., & Nafees, B. (2018). Impact of financial development and credit information sharing on the use of trade Credit: Empirical evidence from Pakistan. *Cogent Economics and Finance*, 6(1), 1-17. doi. 10.1080/23322039.2018.1483466

Alsaleh, M., & Rahim, A.A.S. (2018). Economic determinants of bioenergy trade intensity in EU -28. A cointegrtion approach. *MDPI Sustainability*, 10(2), 565. doi. 10.3390/su10020565

Epaphra, E. (2016). Foreign direct investment and sectoral performance in Tanzania. *Journal of Economic and Political Economy*, 3(4), 670-719.

Kamal, M.A., Sara, Z.L., Nazeer, A., Khan, K., & Shafi, K. (2014). Interlinkage between FDI and exchange rate: An empirical evidence from Pakistan. *Developing Country Studies*, 4(21), 122-129.

Khalid, M.A., Ali, K.H.A. (2017). Investigation of relationship between trade openness and economic growth in the case of China. *International Journal of Research Granthalayah*, 5(7), 199-213. doi. 10.5281/zendo.836438

Kogid, M., Mulok, D., Mansur, K., & Beatrics, L.Y. (2010). Determinants factors of economic growth in Malaysia: Multivariate cointegration and causality analysis. *European Journal of Economics, Finance & Adminstrative Sciences*, 24(24), 123-137.

Nkoro, E. (2016). Autoregressive distributed lag (ARDL) cointegration technique application and interpretation. *Journal of Statistical & Econometric Methods*, 5(4), 63-91.

Osuna, A.A. (2016). Human capiital foramtion and foreign direct investment: Is it a non linear relationship. *Acta Universitaria Scientific Journal*, 26(4), 66-78. doi. 10.15174/au.2016 1032

Qayoom, U., & Mahmood, Z. (2013). Interlinkage between foreign direct investment and foreign trade in Pakistan: Are they complements or substitute. *Pide Working Paper*. [Retrieved from].

Rathanasiri, R.A., & Wijesinghe, T.C. (2012). Government fiscal operation and financial deepnning in Sri Lanka. *Excel International Journal of Multidisciplinary Management Studies*, 2(2), 38-54.

Shawa, M.J., & Shen, Y. (2013). Analysis of the determinants of trade balance: Case study of Tanzania. *International Journal of Business and Economic Research*, 2(6), 134-141. doi. 10.11648/j-ijber.20130206.13

Subhani, M.I., & Kumar, R. (2009). Bilaterl trade a study on SAARC countries. *South Asian Journal and Management Sciences*, 3(2), 15-21.

Sultan, Z.A., & Haque, M.I. (2011). Estimation of cointegration relationship between growth, domestic investment and exports. The Indian economy. *International Journal of Economics and Finance*, 3(4), 226-232. doi. 10.5539/ijef.v3n4p226

Vaidya, R.R. (2011). The determinants of trade credit: Evidence from Indian manufacturing firm. *Scientific Research Journal*, 707-716. doi. 10.4236/me 2011-25079