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The Impact of Volatile Exchange Rate on Commodity Wise Trade of Pakistan to Its Major Trading Partner China: An Empirical Case Study

Ahmer Bilal (Corresponding author)

PhD Scholar, School of Economics

Zhongnan University of Economics and Law, Wuhan, China

E-mail: ahmerbilal1987@gmail.com

Xiaoping Li

Ph.D., Professor, School of Economics

Zhongnan University of Economics and Law, Wuhan, China

Muhammad Zubair Chishti

School of Economics, Quaid e Azam University, Islamabad, Pakistan

Minhaj Ali

PhD Scholar, School of Economics

Zhongnan University of Economics and Law, Wuhan, China

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Abstract

The current study endeavors to explore the effects of oscillations in exchange rate on commodity wise trade flow between Pakistan and China, employing the data for the time period of 1982-2017. Applying ARDL Bound Testing approach, we find that 63% exporting and 55% importing industries of Pakistan demonstrate the co-integration. Further, employing

ARDL technique, the current study deduces that 55% in the short run and 18% exporting industries in the long run respond to the volatility. In imports function, the volatility affects 56% industries in short as well as long run. Intriguingly, two exporting industries coded as 651 (57% share) & 652 (13% share) do not respond to the volatility. And, this is the unique aspect of our study.

Keywords: Pakistan, China, ARDL approach, Exchange rate volatility

1. Introduction

The researchers have bothered to study the impacts of vicissitudes in the exchange rate on international trade in as much as advent of current float in 1970's. Also, they have expounded on that the trade flows may get the benefits and the losses due to vicissitudes in exchange rate depending upon the degree of risk (Bahmani-Oskooee, Iqbal & Khan 2016). Taking one hundred articles, Bahmani-Oskooee and Hegerty (2007) presented the utter details regarding the literature on the volatile EXR (Note 1) and its impacts on trade flows. Further, they assorted the literature into three bunches. The first bunch of literature consists of those articles which have used the aggregated data of one country with the whole world's economies. The second bunch presents those articles in which, in order to downgrade the bias of aggregation, disaggregated data are employed for bilateral trade between one economy and her major partners of trade. The last bunch of studies employs commodity wise industry data of two countries to downgrade bias aggregation at further level. The last bunch of literature provides more significant and more unbiased findings regarding the impacts of volatile exchange rate on trade flows as compare to first two bunches, on the account of employing disaggregated data.

The prime intension of the current study is to reckon with the commodity wise trade flows between Pakistan and China. Although the economy of Pakistan is crippled by the problems of energy's shortfall, security as well as law and order, it has commenced his journey to development, stability and prosperity. The economy of Pakistan is 6th largest country with respect to population and almost 60 percent of the entire population is labor force (Pakistan Economics Survey, 2017-2018). In addition, Pakistan' economy has bothered to liberalize the trade and regime of the investment through the trade agreements and commitments formed with China.

Since the largest trading partner of Pakistan regarding exports and imports is China, we reckon with the commodity wise trade flows between Pakistan and China. The computed exports of Pakistan were almost 7% of total exports while the computed imports were almost 28% of total imports in FY 2018 (Note 2). In addition, China and Pakistan have signed a free trade agreement on 24 November 2006 (Note 3). Further, China has started a massive and historical project named "CPEC" (Note 4) with Pakistan and the worth of this project is virtually $62 billion (Note 5). Moreover, many companies of China have worked and have presented their services for the growth and the development of Pakistan economy through investment and the production of highly skilled jobs. The vicissitudes in nominal exchange rate are considered to be limited while the Pakistan economy has adopted the floating exchange rate system in 1982. However, due to prices changes, real exchange rate may

fluctuate with the passage of time and this fluctuation may create more volatility in EXR. As a result, this volatility can create more capriciousness to trade flows.

The rest of the paper is organized as follows, section 2 represents the literature from previous studies, data, econometric model and techniques are discussed in section 3, section 4 represents the conclusion and policy recommendations.

2. Literature Review

There is abundance of studies which investigate the volatility and trade nexus, considering different economies. In general, all these studies can be classified in four bunches. Whereas the first bunch is concerned, it consists of the studies which check the effects of volatility on trade taking different sets of countries. As Arize et al (2006), employing the panel data for 8 Latin American economies, show that trade face loss due to the volatility in both time periods i.e. short and long run. Similarly, Haya kwana and Kimura (2009) also deduce that the volatility affects the exports of 60 East Asian counties adversely. Further, Hall et al (2010), Senenis & Tsounis (2013) (Note 6), Nacita (2013) & Husain & Choudhary (2015) explore the mix results regarding effects of EXR volatility.

As for as the second bunch is concerned, it includes the studies which analyze the volatility and trade nexus taking one country's trade with its partners. As Aguiree et al (2007), Javed and Farooq (2009), Jantarakolica & Chalermasok (2012), Demez & Ustaoglu (2012), and Reza & Bazargan (2014) investigate the effects of the volatility on the trade of Brazil, Pakistan, Thailand, Turkey and Iran respectively and intend to show no significant impact. Further, Humayon et al (2014), Panda & Muhanty (2015) and Odili (2015) results that exports of Pakistan, India and Nigeria respectively get the loss on the account of oscillations in EXR (Note 7).

The third bunch is of the studies which investigate the volatility and trade nexus taking bilateral trade case study. As Sekantsi (2011) taking South Africa and USA trade, Bristy (2013) taking Bangladesh and its major trading partners, and Nishimura & Hirayama (2013) taking Japan and China, show that the vicissitudes in EXR hurt the exports of each country. In addition, Choudhary and Hassan (2015) results that UK's imports from China, Brazil and South Africa show positive, neutral and negative effects respectively due to the volatility.

The ample body of literature presented above suffers from the exigency of aggregation bias on the account of using aggregate data and to handle this exigency. And to fill this gap, many studies employ the more disaggregated data Such as Bahmani-Oskooee and Wang (2007), Bahmani Oskooee and Mitra (2008), Bahmani Oskooee and Hegerty (2009), Bahmani Oskooee et al (2010), Bahmani Oskooee et al 2013), Bahmani Oskooee et al (2014), Baek (2014), and Simakova and Stavarek (2015) employ the disaggregated data and show the more detailed and reliable results. Also, Alam, Ahmed & Shahbaz (2017) deduces that exports of Pakistan's industries to selected economies, overall, enjoy benefits in the short as well as in the long run. Similarly, taking the commodity trade between China and Malaysia, Bahmani-Oskooee & Aftab (2018) finds that one-third of 59 selected industries respond to the volatility in which 40% industries enjoys benefits due to the volatility, including a big

share-holder industry with share of 25%. However, Latief & Lefen (2019) takes the selected economies of *"One belt & One Road"* including Pakistan and explores that EXR volatility affects the international trade and FDI adversely. Summarizing up, it is transparent now that we can attain more positive findings, using disaggregated data. Therefore, the current study endeavors to explore the dynamic effects of oscillations in EXR on commodity wise trade flow between Pakistan and China. Since according to our best knowledge, there is not a single study regarding our proposed study, it is worth investigating the effects of the volatility on trade between both economies. To compute the empirical findings, we move to the next section.

3. Data and Econometric Technique

For empirical analysis, we take the data for the variables of "Gross Domestic Product" (GDP) and Exchange rate from the most authentic resources "World Development Indicators" (WDI (Note 8)) & "International Monetary Fund" (IMF) (Note 9) respectively. Moreover, for commodity data, we consult "World Integrated Trade Solution" (WITS) (Note 10). To measure the dynamic, we take the data for the time period of 1982-2017. Also, the table 1 presents the details thoroughly.

Table 1. Variables and data sources

Variable Name	Symbol	Source
Gross Domestic Product	Y_t	WDI
Real Bilateral Exchange rate	rex_t	IMF
Volatility of Exchange rate	Vol_t^*	Author's calculation

* Volatility is measured by employing "Standard Deviation of 12 months".

3.1 Econometric Model

To analyze the effects of oscillations in exchange rate on commodity trade of Pakistan to China, we specify the following model, opted by Bahmani-Oskooee, Iqbal & Khan (2016),

$$lnX_{i,t} = a + blnY_t + \varphi\, lnrex_t + \lambda\, lnVol_t + e_t \quad (1)$$

$$lnM_{i,t} = a + blnY_t + \varphi\, lnrex_t + \lambda\, lnVol_t + e_t \quad (2)$$

In equation 1, X represents exports and M represents imports of Pakistan respectively. Further, Y represents GDP, rex represents real bilateral exchange rate, and Vol represents volatility in exchange rate in both equations.

Again, following Bahmani-Oskooe et al. (2016), we extend our model for co-integration. To apply ARDL approach propounded by Pesaran et al. (2001), we present our models as follows:

$$\Delta lnX_t = b_i + \sum_{l=1}^{n1} d_l \Delta\, lnX_{t-l} + \sum_{l=0}^{n2} e_l \Delta\, lnY^{CH}{}_{t-l} + \sum_{l=0}^{n3} g_l \Delta\, lnREX_{t-l}$$

$$+ \sum_{l=0}^{n4} h_l \Delta\, lnV_{t-l} + \partial_1 lnX_{t-l} + \partial_2 lnY^{CH}{}_{t-l} + \partial_3 lnREX_{t-l}$$

$$+\partial_4 lnV_{t-l} + V_{t-l} \quad (3)$$

$$\Delta lnM_t = c_i + \sum_{l=1}^{m1} d_l \Delta\, lnM_{t-l} + \sum_{l=0}^{m2} e_l \Delta\, lnY^{PK}{}_{t-l} + \sum_{l=0}^{m3} g_l \Delta\, lnREX_{t-l}$$

$$+ \sum_{l=0}^{m4} h_l \Delta\, lnV_{t-l} + \partial_1 lnM_{t-l} + \partial_2 lnY^{PK}{}_{t-l} + \partial_3 lnREX_{t-l}$$

$$+\partial_4 lnV_{t-l} + V_{t-l} \quad (4)$$

Whereas equation 3 is concerned, it represents exports function of Pakistan to China. Further, Y^{CH} shows China's GDP, REX shows real bilateral exchange rate, V shows volatility of EXR. Also, Y^{PAK} represents Pakistan's GDP in equation 4. Moreover, both equations represent short as well as long run coefficients. To select optimum lags for short run coefficients, we apply "Akaike Information Criterion".

We engage ARDL approach due to the following salient features: ARDL is applicable even for the small sample size, it has the capability to estimate the variables which I (0) and I (1) at the time, and ARDL does not require unit root tests before estimate (Meo et al. 2018). Another benefit to apply ARDL technique is that is a single step equation (Bahmani-Oskooee et al. 2016). However, it has no capacity to deal with the variable I (2) (Meo et al. 2018).

Further, for co-integration to check long run dynamics, we employ F table by Pesaran et al. (2001) which possesses radical critical values. In addition, there critical values have upper bound and lower bound. The F-value calculated lies below the lower that bound signifies no long run dynamic. If it lies between the lower bound and upper bound, it signifies inconclusive long run relationship. While the F-calculated value lies above the upper bound deduces the long run relationship among variables.

3.2 Estimation and Results

Before estimation for dynamic findings, we apply "Augmented Dickey Fuller" unit root test. Although, ARDL technique does not require any unit root test. However, on the account of weakness of ARDL approach that it is not applicable if a variable is I (2) (Ibrahim, 2015), it is imperative to verify that the variables in our model should be integrated at I (2). Moreover, this technique is suitable if the variables are 1(0) & I (1). So, we apply ADF test to avoid this problem and fortunately, there is not a single variable in our model which is integrated at

second difference. Consequently, we can proceed to measure the dynamic effects of the volatility. Table 2 shows the results of ADF test.

After testifying that there is no variable in our model at I(2), we proceed to check the co-integration among variable, for long run dynamic relationships. Out of 38 selected exporting industries, 24 industries coded as 61, 221, 266, 276, 283, 292, 531, 541, 611, 652, 654, 655, 659, 667, 696, 697, 698, 719, 783, 841, 861, 893, 898, & 899 possess the long run dynamics. The remaining 14 industries coded as 31, 263, 268, 273, 284, 334, 512, 599, 651, 655, 658, 663, 892, & 894 do not show long run relationship.

Whereas the long run dynamics of importing industries are concerned, 24 industries, out of 44, demonstrate the long run relationships and their codes are 54, 61, 242, 243, 266, 291, 332, 581, 599, 629, 631, 632, 642, 654, 663, 674, 677, 678, 691, 692, 693, 695, 712, & 723. Further, the remaining 20 industries do not have long run dynamics (Note 11).

Table 2. ADF test results

Variable	**ADF Test**	
	I (0)	**I (1)**
REX $^{(China\ to\ Pak)}$	-3.410**	-
REX $^{(Pak\ to\ China)}$	-1.985	-3.249**
Volatility $^{(China\ to\ Pak)}$	-3.947*	-
Volatility $^{(Pak\ to\ China)}$	-0.823	-5.549*
GDP $^{(China)}$	0.739	-4.399*
GDP $^{(Pakistan)}$	0.658	-5.377*

Note: *, **, *** shows the significance at 1%, 5% & 10% respectively.

Moving to the empirical findings, we discuss, firstly, the export function. In the short run, the following 18 industries, viz, coded as 31, 61, 263, 266, 273, 284, 332, 512, 651, 655, 658, 663, 696, 697, 698, 783, 841 & 899 enjoy the gain on account of volatility. Further, there are only 3 industries coded as 268, 659 & 893 which face the loss due to the oscillations in EXR (Note 12). Whereas the long-run dynamical outcomes are concerned, the current study deduces that, intriguingly, there is only one industry coded as 31 faces the loss (Note 13). While the following 6 industries i.e. 268, 284, 332, 655, 696 & 898 gain the benefit during the volatility. Moreover, the remaining industries coded as 61, 263, 266, 273, 276, 283, 292, 512, 541, 611, 651, 652, 654, 656, 658, 659, 663, 697, 698, 719, 783, 841, 861, 893 & 899 enjoy neither benefit nor loss on account of volatility. Another unique finding is that two

industries coded as 651 & 652 having the share of 57% and 13% respectively are in list of the industries which do not respond to the volatility.

To sum up, the results mentioned above reveal that majority of the industries gain benefit in the short run and in the long-run, most of the industries do not respond to the volatility. Table 03 Short Run and Long Run Coefficient Results (Export Function).

Further, the F-values which show the co-integration and ECM values which is also another way to verify the long run relationship are reported in Table 04 Diagnostic Test.

Whereas the import function is concerned, there are 21 industries, in the short run, which show positive response to the volatility and their codes are 54, 231, 243, 275, 292, 332, 611, 629, 631, 642, 663, 674, 677, 682, 691, 694, 695, 712, 722, 723, & 724. There are, on the contrary, only four industries, viz, 61, 612, 641, & 654 which face loss. Further, the remaining 19 importing industries enjoy neither loss nor benefit in the short run.

Again, 21 industries coded as 54, 61, 231, 266, 275, 291, 332, 629, 632, 641, 642, 651, 663, 674, 677, 682, 693, 694, 696, & 712, in the long run, get the loss. Only four (Note 14) industries, however, enjoy the benefit on the account of volatility. Moreover, the 19 industries remain indifferent during the volatility in EXR. Intriguingly, the large share having industry coded as 724 (Note 15) enjoys gain in the short run and show no response in long run to the volatility. Again, it is unique finding of the current study.

Summing up, most of the importing industries take the advantage in the short run, including large shareholder industry coded as 724 (10% share). Moreover, majority of the industries, in the long run, face the loss due to the volatility. And, the large shareholder industry demonstrates no response to the oscillations in EXR. (See Table 05 Short Run and Long Run Coefficient Results (Import function)).

In addition, ECM values are also reported which is another way to verify long run dynamics. For instance, an exporting industry coded as 221 possesses 0.51 ECM value which signifies this industry is showing 51% convergence to the equilibrium in the long run. Another exporting industry coded as 282 shows 54% convergence in half of the years.

Table 3. Short run and long run coefficient results (export function)

Table 01			Short Run Estimates					Long Run Estimates		
code	Industries	Trade Share %	d (Ln. v)	d (Ln. v (-1)	d (Ln. v (-2)	D (Ln. v (-3)	Constant	Y China	Ln ex	Ln V
31	Fish, fresh & simply preserved	2.552906389	-0.947(0.270)	-0.726(0.394)	1.969(0.033)		-46.618(0.000)	4.313(0.000)	1.411(0.161)	-6.354(0.084)
61	Sugar and honey	0.008699133	3.084(0.066)				131.730(0.599)	-12.330(0.594)	-11.709(0.540)	7.631(0.682)
221	Oil seeds, oil nuts and oil kernels	0.91751459	1.005(0.152)	0.938(0.217)			-22.771(0.015)	2.124(0.009)	1.121(0.031)	0.144(0.938)
263	Cotton	2.349514355	0.747(0.449)	1.077(0.315)	0.628(0.545)	2.633(0.015)	-78.779(0.247)	7.512(0.220.0	7.950(0.311)	-24.473(0.439)
266	Synthetic and regenerated artificial	0.003015767	1.165(0.224)	1.045(0.260)	-0.774(0.391)	2.087(0.018)	-10.668(0.696)	1.336(0.572)	1.862(0.428)	-17.224(0.409)
268	Wool and other animal hair	0.524682383	0.955(0.256)	-1.032(0.224)	-1.75690.101)	1.351(0.164)	-4.381(0.023)	0.536(0.002)	0.987(0.000)	1.411(0.082)
273	Stone, sand and gravel	2.997626766	0.356(0.485)	0.006(0.990)	-0.071(0.892)	2.145(0.000)	-91.497(0.173)	8.284(0.204)	5.994(0.574)	-35.144(0.585)
276	Other crude minerals	0.507073943								
283	Ores & concentrates of non-ferrous	3.725341663	1.020(0.335)				-34.833(0.000)	3.167(0.000)	0.237(0.392)	0.932(0.395)
284	Nonferrous metal scrap	2.501477287	1.960(0.024)				-45.697(0.000)	4.225(0.000)	0.940(0.236)	6.254(0.000)
292	Crude vegetable materials	1.489174168	0.129(0.746)	0.809(0.061)			-15.776(0.083)	1.652(0.038)	0.703(0.189)	-1.853(0.371)
332	Petroleum products	0.364619363	1.980(0.059)				-58.099(0.003)	4.884(0.003)	0.327(0.635)	5.030(0.075)
512	Organic chemicals	0.662375471	0.134(0.922)	3.194(0.053)	1.101(0.498)		-38.531(0.004)	3.427(0.002)	-0.176(0.845)	-2.936(0.675)
531	Chemical elements and compounds	1.220651635	0.912(0.3807)				-54.020(0.001)	4.655(0.001)	-0.272(0.631)	2.079(0.328)
541	Medicinal & pharmaceutical products	0.015735338	-0.154(0.600)	-0.112(0.709)	-0.157(0.588)	0.674(0.021)	-11.628543	0.987(0.054)	0.302(0.426)	-3.402(0.211)
599	Chemical materials and products, n.	0.03162219	-0.154(0.761)	-0.558(0.290)	0.839(0.1195)	0.911(0.0836)	-24.910(0.0003)	2.085(0.000)	0.126(0.653)	-3.254(0.1374)
611	Leather	4.217200349	0.053(0.913)				-48.499(0.227)	4.251(0.201)	0.712(0.541)	0.355(0.913)
651	Textile yarn and thread	57.8615949	0.016(0.986)	1.243(0.274)	1.876(0.087)		-57.078(0.021)	5.547(0.012)	2.568(0.211)	-7.553(0.376)
652	Cotton fabrics, woven ex. narrow or	13.00890531	-0.374(0.521)				-71.091(0.346)	6.171(0.323)	1.167(0.613)	-3.376(0.635)
654	Text fabrics woven ex narrow, spec,	0.38016308								
655	Special textile fabrics and related	0.056750733	1.571(0.009)				-24.607(0.000)	2.255(0.000)	0.362(0.117)	2.134(0.022)
656	Special transactions not classed	5.03512E-05	0.016(0.985)				7.577(0.446)	0.818(0.618)	0.2458(0.553)	0.0269(0.952)
658	Made up articles, wholly or chiefly	1.505769999	-0.033(0.937)	-0.332(0.495)	1.010(0.045)	0.628(0.134)	-32.855(0.000)	2.957(0.000)	0.849(0.044)	-1.643(0.350)
659	Floor coverings, tapestries, etc.	0.033752911	0.660(0.287)	0.611(0.271)	-1.074(0.045)		-19.269(0.003)	1.650(0.002)	-0.082(0.766)	1.989(0.342)
663	Mineral manufactures	0.131774672	-0.332(0.575)	0.793(0.241)	1.289(0.049		-29.809(0.000)	2.623(0.000)	0.017(0.963)	-3.447(0.176)
667	Pearls and precious and semi-precious	0.16777322	0.125(0.739)				-9.384(0.043)	0.902(0.021)	0.242(0.219)	0.233(0.747)
696	Cutlery	0.149052853	0.975(0.102)				-31.692(0.000)	2.836(0.000)	-0.279(0.262)	1.543(0.097)
697	Household equipment of base metals	0.006190433	-0.021(0.970)				-18.807(0.000)	1.530(0.000)	0.043(0.768)	-0.020(0.970)
698	Manufactures of metal	0.034351449	1.410(0.017)				-28.3859(0.000)	2.542(0.000)	0.674(0.026)	0.568(0.578)
719	Machinery and appliances non electric	0.005013848								
783	Road motor vehicles	0.004440462	1.158(0.104)				-23.927(0.000)	2.245(0.000)	0.481(0.077)	1.356(0.119)
841	Clothing except fur clothing	1.441123952	0.661(0.168)	0.219(0.705)	1.402(0.017)		-30.703(0.000)	2.859(0.000)	0.919(0.068)	-1.063(0.628)
861	Scientific, medical, optical, meas.	0.818858108	-0.575(0.301)				-81.816(0.443)	7.493(0.450)	0.963(0.678)	-5.982(0.672)
892	Printed matter	0.016527481	0.433(0.103)				-7.484(0.024)	0.677(0.013)	0.032(0.842)	0.751(0.123)
893	Articles of artificial plastic mate	0.055304208	-0.069(0.927)	-1.622(0.047)			-36.100(0.000)	3.091(0.000)	-0.482(0.196)	1.462(0.354)
894	Perambulators, toys, games and sports	0.202492958	-0.176(0.586)				-23.087(0.000)	2.017(0.000)	-0.248(0.261)	1.266(0.183)
898	Musical instruments, sound recorder	0.0016405	0.654(0.230)				1.615(0.709)	-0.028(0.936)	-0.046(0.847)	2.679(0.058)
899	Manufactured articles	0.034351449	0.367(0.452)	-0.268(0.541)	0.359(0.413)	1.181(0.009)	-12.458(0.267)	1.341(0.264)	1.033(0.486)	-2.400(0.415)

Table 4. Diagnostic tests

Code	Industries	F-Val	LM	RESET	CUSUM	CUSUMSQ	Adj. R2	Normality	ECM
31	Fish, fresh & simply preserved	3.00	1.84	1	S	S	0.92	1.33	-0.40(0.02)
61	Sugar and honey	4.61	1.17	0.4	S	S	0.03	1.54	0.17(0.57)
221	Oil seeds, oil nuts and oil kernels	5.84	0.17	2.82	UNS	UNS	0.5	0.03	-0.51(0.03)
263	Cotton	2.42	1.73	0.01	S	S	0.2	16.72	-0.16(0.28)
266	Synthetic and regenerated artificial	4.61	0.02	2.43	S	S	0.44	1.93	-0.21(0.23)
268	Wool and other animal hair	2.81	1.72	1.15	S	S	0.59	1.9	-1.23(0.00)
273	Stone, sand and gravel	2.53	0.59	3.12	S	S	0.93	0.06	-0.09(0.53)
276	Other crude minerals	14.69	2.2	0.56	S	S	0.53	6.65	-0.67 (-5.14)
283	Ores & concentrates of non-ferrous	5.68	0.05	4.22	S	S	0.86	2.18	-1.09(0.00)
284	Nonferrous metal scrap	3.46	1.12	0.24	S	S	0.8	1.07	-0.78(0.00)
292	Crude vegetable materials	4.45	0.8	0.32	UNS	UNS	0.82	2.04	-0.31(0.04)
334	Petroleum products	3.65	0.12	0.1	S	S	0.72	0.6	-0.39(0.00)
512	Organic chemicals	2.57	1.58	2.01	S	S	0.78	1.47	-0.60(0.11)
531	Chemical elements and compounds	6.977	1.08	1.24	S	S	0.72	0.56	-0.58 (-3.69)
541	Medicinal & pharmaceutical products	4.56	0.02	0.2	S	S	0.36	20.75	-0.82 (-3.42)
599	Chemical materials and products, n.	3.18	1.12	2.7	S	S	0.65	0.55	-0.56(0.00)
611	Leather	4.79	0.96	1.59	S	S	0.53	4.2	-0.63 (-4.29)
651	Textile yarn and thread	1.14	1.8	1.06	UNS	UNS	0.94	2.98	-0.27(0.13)
652	Cotton fabrics, woven ex. narrow or	4.15	0.92	6.57	S	S	0.56	7.11	-0.11(0.42)
654	Text fabrics woven ex narrow, spec,	12.81	1.21	1.21	S	S	0.43	0.09	-0.49 (-2.71)
655	Special textile fabrics and related	3.27	1.12	2.39	S	S	0.38	7.31	-0.73(0.00)
655	Special transactions not classed	4.82	0.83	0.46	S	S	0.62	8.4	-0.61(0.00)
658	Made up articles, wholly or chiefly	3.47	0.07	0.77	S	S	0.67	1.49	-0.60(0.00)
659	Floor coverings, tapestries, etc.	6.42	1.19	3.34	S	S	0.79	0.66	-0.57(01)
663	Mineral manufactures	1.39	1.77	3.27	S	S	0.89	1.82	-0.65(0.07)
667	Pearls and precious and semi-precious	5.88	0.63	1.04	S	S	0.53	1.34	-0.53(0.01)
696	Cutlery	4.34	2.09	5.8	S	S	0.75	1.04	-0.63(0.00)
697	Household equipment of base metals	7.73	0.1	0.06	S	S	0.41	1.44	-1.03(0.00)
698	Manufactures of metal	5.36	0.7	1.15	S	S	0.72	0.73	-0.65(0.00)
719	Machinery and appliances non electrical	5.71	0.02	0.2	S	S	0.36	20.75	-1.19 (3.99)
783	Road motor vehicles	9.01	3.69	0.17	S	S	0.64	0.42	-0.83 -(5.01)
841	Clothing except fur clothing	4.24	0.02	3.85	S	S	0.79	0.52	-0.46(0.01)
861	Scientific, medical, optical, meas.	5.81	1.5	0.66	S	S	0.8	10.1	-0.09(0.57)
892	Printed matter	3.62	0.44	0.01	S	S	0.24	6.09	-0.57 (0.00)
893	Articles of artificial plastic mate	4.24	0.23	0.66	S	S	0.59	0.73	-0.678(0.000)
894	Perambulators, toys, games and sports	3.26	0.12	0.1	S	S	0.72	0.6	-0.45(0.00)
898	Musical instruments, sound recorder	4.12	2.11	0.01	S	S	0.42	1.82	-0.74(0.00)
899	Manufactured articles	4.05	0.07	0.77	S	S	0.67	1.49	-0.47(0.47)

Table 5. Short run and long run coefficient results (import function)

			Short Run Estimates					Long Run Estimates		
code	Industries	Trade Share %	d (Ln. v)	d (Ln. v (-1)	d (Ln. v (-2)	D (Ln. v (-3)	Constant	Y Pak	Ln ex	Ln V
54	Vegetables, roots & tubers	0.06321045	-0.230(0.223)	0.526(0.044)	-0.324(0.100)		-206.858(0.000)	19.016(0.001)	-0.050(0.840)	-0.246(0.044)
61	Sugar and honey	0.078299441	-0.108(0.739)	-0.578(0.078)			15.918(0.811)	-1.091(0.858)	-0.366(0.845)	-0.214(0.0324)
231	Crude rubber, incl. synthetic	0.122446227	0.220(0.027)	-0.054(0.670)	0.067(0.0585)	0.219(0.030)	-101.098(0.000)	9.592(0.000)	0.094(0.763)	-0.217(0.000)
242	Wood in the rough or roughly square	5.16102E-07	0.849(0.011)				119.400(0.016)	-10.924(0.016)	0.077(0.626)	0.363(0.012)
243	Wood, shaped or simply worked	0.0062	-0.027(0.915)	-0.843(0.012)	0.696(0.008)		-56.264(0.537)	5.013(0.546)	2.863(0.083)	0.092(0.739)
266	Synthetic and regenerated-artificial	1.862754803	0.108(0.471)	0.224(0.148)			-217.92490.000)	20.438(0.000)	-0.203(0.282)	-0.351(0.032)
275	Natural abrasives – incl. industrial	0.003475332	0.191(0.030)	-0.154(0.168)	0.259(0.003)		-81.011(0.029)	7.543(0.026)	-0.043(0.671)	-0.156(0.107)
291	Crude animal materials	0.005682978	0.089(0.744)	0.352(0.232)			-296.335(0.009)	27.119(0.009)	0.213(0.858)	-0.693(0.022)
292	Crude vegetable materials	0.396199798	0.011(0.821)	0.019(0.760)	-0.095(0.177)	0.112(0.047)	-17.030(0.599)	2.147(0.472)	0.020(0.871)	-0.148(0.148)
321	Coal, coke & briquettes	0.208699799	0.221(0.265)				28.374(0.846)	-2.205(0.869)	1.436(0.321)	0.472(0.249)
332	Petroleum products	0.306553908	-0.097(0.140)	0.115(0.092)			-83.866(0.020)	8.215(0.014)	0.0399(0.742)	-0.323(0.001)
581	Plastic materials, regenerd Cellulose	3.699823423	0.089(0.197)				232.334(0.395)	-20.629(0.408)	-0.730(0.222)	0.515(0.422)
599	Chemical materials and products	2.126551148	0.018(0.580)				67.277(0.394)	-5.173(0.467)	2.173(0.302	0.100(0.595)
611	Leather	0.046000571	0.281(0.043)				105.144(0.030)	-9.331(0.034)	-0.131(0.373)	0.361(0.011)
612	Manuf. of leather or of artificial	0.019068116	-0.340(0.074)				49.723(0.713)	-4.347(0.724)	0.0827(0.827)	0.325(0.391)
629	Articles of rubber	1.844399773	-0.102(0.100)	0.121(0.129)	-0.195(0.019)	0.103(0.076)	-70.845(0.011)	7.179(0.006)	1.756(0.053)	-0.176(0.028)
631	Veneers, plywood boards & other	0.050271591	0.301(0.087)				-70.461(0.495)	6.815(0.470)	-0.325(0.199)	0.114(0.705)
632	Wood manufactures	0.091834169	0.074(0.709)				-188.226(0.001)	17.530(0.001)	-0.500(0.002)	-0.426(0.007)
633	Cork manufactures	0.002696587	0.105(0.113)				79.350(0.113)	-7.267(0.111)	-0.029(0.847)	0.237(0.091)
641	Paper and paperboard	1.087077868	-0.128(0.002)				-204.917(0.056)	19.477(0.049)	0.227(0.723)	-0.702(0.022)
642	Articles of paper, pulp, paperboard	0.353054424	-0.175(0.056)	0.028(0.776)	-0.011(0.909)	0.250(0.020)	-235.640(0.000)	21.921(0.000)	0.004(0.975)	-0.632(0.000)
651	Textile yarn and thread	5.404422214	-0.153(0.037)	0.068(0.377)	-0.103(0.188)	0.156(0.049)	-260.819(0.000)	24.524(0.000)	0.134(0.594)	-0.653(0.000)
654	Tulle, lace, embroidery, ribbons	0.154837969	-0.168(0.130)	-0.171(0.084)			-114.757(0.005)	10.832(0.004)	0.185(0.641)	-0.095(0.378)
663	Mineral manufactures	0.18252304	-0.098(0.038)	0.107(0.022)			-25.991(0.088)	2.855(0.044)	0.351(0.241)	-0.130(0.005)
666	Pottery	0.152835836	-0.161(0.047)				18.276(0.823)	-1.116(0.880)	0.362(0.330)	0.030(0.889)
674	Universals, plates and sheets of iron	4.237168614	-0.054(0.652)	0.198(0.189)	-0.363(0.021)	0.279(0.014)	-225.893(0.000)	21.282(0.000)	2.943(0.108)	-0.413(0.033)
677	Iron and steel wire, excluding wire	0.0809539	-0.066(0.405)	0.252(0.022)	-0.26390.025)	0.136(0.093)	-70.594(0.133)	6.881(0.112)	3.406(0.022)	-0.215(0.106)
678	Tubes, pipes and fittings of iron ore	0.920670896	-0.030(0.730)	0.136(0.118)			-58.385(0.239)	5.972(0.192)	-0.903(0.151)	-0.215(0.129)
679	Iron steel castings forgings unworked	0.038873199	-0.227(0.260)				88.176(0.371)	-7.762(0.387)	0.052(0.878)	0.354(0.211)
682	Copper	0.253002212	-0.311(0.023)	0.062(0.678)	-0.14290.320)	0.441(0.003)	-181.941(0.000)	17.025(0.000)	-0.171(0.203)	-0.425(0.000)
684	Aluminum	0.441078872	0.027(0.569)				40.243(0.703)	-3.027(0.752)	-0.183(0.539)	0.155(0.579)
689	Miscell. non-ferrous base metals	0.111027209	-0.058(0.588)				-67.855(0.306)	6.511(0.282)	-0.188(0.327)	-0.103(0.571)
691	Finished structural parts	0.443492478	0.078(0.671)	-0.084(0.727)	-0.555(0.033)	0.432(0.028)	31.732(0.558)	-2.478(0.618)	-0.961(0.067)	0.240(0.133)
692	Metal containers for storage	0.09688648	0.222(0.094)				-50.861(0.194)	4.954(0.169)	-0.332(0.192)	0.197(0.092)
693	Wire products	0.202630707	-0.197(0.050)				-65.794(0.038)	6.440(0.028)	-0.32190.000)	-0.174(0.048)
694	Nails, screws, nuts, bolts, rivets and	0.160953003	-0.076(0.195)	0.23090.005)	-0.132(0.107)	0.276(0.001)	-145.759(0.000)	13.685(0.000)	-0.221(0.224)	-0.400(0.000)
695	Tools for use in the hand or in	0.146114619	-0.059(0.240)	0.073(0.202)	-0.134(0.035)	0.130(0.018)	-44.250(0.474)	4.630(0.421)	1.169(.314)	-0.322(0.154)
696	Cutlery	0.05381099	-0.028(0.684)	0.179(0.024)			-125.116(0.001)	11.756(0.001)	-0.189(0.032)	-0.380(0.000)
712	Agricultural machinery	0.137148273	-0.072(0.481)	0.283(0.106)	-0.405(0.025)	0.356(0.005)	-160.395(0.000)	15.089(0.000)	4.333(0.024)	-0.486(0.000)
714	Office machines	1.503441309	-0.110(0.244)				75.444(0.486)	-6.083(0.537)	1.081(0.522)	0.166(0.573)
722	Electric power machinery and switch	4.773585958	0.012(0.914)	0.124(0.421)	-0.095(0.542)	0.232(0.067)	-103.515(0.021)	10.175(0.014)	-0.173(0.457)	-0.213(0.085)
723	Equipment for distributing electric	0.721620631	-0.013(0.925)	0.196(0.245)	-0.418(0.024)	0.314(0.022)	3.742(0.878)	0.187(0.933)	-0.402(0.214)	0.044(0.531)
724	Telecommunications apparatus	9.675950465	0.084(0.475)	0.261(0.102)	-0.374(0.026)	0.383(0.004)	-139.947(0.000)	13.505(0.000)	1.428(0.051)	-0.102(0.190)
861	Scientific, medical, optical, meas./co	1.093096898	-0.042(0.368)				-8.622(0.633)	1.421(0.394)	-0.173(0.026)	-0.047(0.418)

Table 6. Diagnostic test (import function)

Code	Industries	F	ECM	LM	RESET	CUSUM	CUSUMSQ	Adj. R2	Normality
54	Vegetables, roots & tubers	5.20	-1.16(0.03)	0.17	1.28	S	S	0.91	2.29
61	Sugar and honey	5.97	-1.02(0.00)	3.05	0.24	S	S	0.61	0.47
231	Crude rubber, incl. synthetic	3.11	-1.33(0.00)	2.27	1.14	S	S	0.44	1.14
242	Wood in the rough or roughly square	6.72	-1.16(0.00)	0.92	3.07	S	S	0.49	1.32
243	Wood, shaped or simply worked	3.89	-0.51(0.00)	3.96	0.001	S	S	0.51	3.79
266	Synthetic and regenerated-artificial	5.98	-0.55(0.00)	1.25	0.22	S	S	0.87	2.04
275	Natural abrasives – incl. industrial	2.30	-0.58(0.00)	2.01	2.33	S	S	0.67	0.45
291	Crude animal materials	5.75	-0.59(0.00)	0.45	0.47	S	S	0.56	0.43
292	Crude vegetable materials	2.72	-0.50(0.01)	0.94	0.34	S	S	0.87	1.11
321	Coal, coke & briquettes	2.85	-0.46(0.00)	2.43	0.82	S	S	0.76	0.18
332	Petroleum products	5.41	-0.45(0.00)	0.08	0.68	S	S	0.85	2.34
581	Plastic materials, regenerd. Cellulose	4.27	-0.17(0.27)	2.3	0.1	S	S	0.89	0.66
599	Chemical materials and products	3.91	-0.18(0.18)	1.09	1.73	S	S	0.9	0.87
611	Leather	2.92	-0.77(0.00)	0.12	3.46	S	S	0.55	0.75
612	Manuf. of leather or of artificial	1.08	-0.28(0.01)	0.87	0.67	S	S	0.82	0.66
629	Articles of rubber	3.77	-0.62(0.05)	2.15	0.05	S	S	0.14	1.12
631	Veneers, plywood boards & other wood	6.74	-0.37(0.04)	9.3	0.18	S	S	0.73	27.55
632	Wood manufactures	6.16	-0.80(0.00)	1.1	0.08	S	S	0.63	1.16
633	Cork manufactures	2.87	-0.44(0.00)	1.97	2.4	S	S	0.64	0.42
641	Paper and paperboard	3.32	-0.18(0.03)	1.9	0.05	S	S	0.96	3.16
642	Articles of paper, pulp, paperboard	5.49	-0.80(0.00)	1.76	1.54	S	S	0.88	0.76
651	Textile yarn and thread	1.43	-0.40(0.04)	1.28	0.5	S	S	0.98	0.42
654	Tulle, lace, embroidery, ribbons	5.23	-0.61(0.02)	0.03	3.27	S	S	0.9	0.27
663	Mineral manufactures	5.48	-0.68(0.00)	0.25	1.9	UNS	UNS	0.62	0.08
666	Pottery	2.23	-0.19(0.05)	1.84	1.89	S	S	0.74	0.09
674	Universals, plates and sheets of iron	3.95	-0.63(0.01)	0.93	0.01	S	S	0.95	0.61
677	Iron and steel wire, excluding wire	4.48	-0.41(0.00)	1.43	0.23	S	S	0.83	1.27
678	Tubes, pipes and fittings of iron ore	5.67	-0.40(0.06)	0.19	0.28	S	S	0.64	0.41
679	Iron steel castings forgings unworked	2.31	-0.34(0.03)	0.21	0.89	S	S	0.75	23.96
682	Copper	3.30	-1.22(0.00)	0.9	0.44	S	S	0.71	0.19
684	Aluminum		-0.17 (0.11)	2.8	0.2	S	S	0.88	1.41
689	Miscell. non-ferrous base metals	3.087	-0.56(0.00)	7.63	3.58	S	S	0.65	3.93
691	Finished structural parts	3.96	-0.88(0.00)	0.81	1.82	S	S	0.68	7.21
692	Metal containers for storage	5.49	-1.12(0.00)	0.87	2.06	S	S	0.84	2.46
693	Wire products	6.87	-1.13(0.00)	0.46	0.82	S	S	0.41	1.51
694	Nails, screws, nuts, bolts, rivets and	3.13	-0.80(0.00)	4.62	0.25	S	S	0.93	0.63
695	Tools for use in the hand or in machine	4.74	-0.35(0.15)	3.55	0.33	S	S	0.95	0.81
696	Cutlery	2.60	-0.48(0.00)	2.32	2.64	S	S	0.77	0.59
712	Agricultural machinery	4.54	-0.840(0.001)	1.3	1.34	S	S	0.22	20.12
714	Office machines	1.78	-0.163(0.09)	0.83	0.02	S	S	0.91	0.24
722	Electric power machinery and switch	1.63	-0.736(0.00)	1.45	0.01	S	S	0.69	0.37
723	Equipment for distributing electric	4.77	-1.27(0.00)	1.01	0.03	UNS	UNS	0.5	0.03
724	Telecommunications apparatus	2.08	-1.05(0.00)	0.77	0.9	S	S	0.94	1.07
861	Scientific, medical, optical, meas./co	2.32	-0.90 (0.03)	1.1	0.3	S	S	0.37	0.8

We also performed post estimation tests to verify the accuracy of our outcomes, as Table 06 (Diagnostic Test) shows. Firstly, using LM test, we find that there is one industry in export function and five in imports function which are crippled by the problem of autocorrelation. Further, Ramsey Reset test indicates that there are 7 exporting and 4 importing industries which have the problem of misspecification. Also, we apply CUSUM & CUSUMQ test and find that 3 exporting and 2 importing industries possess the exigency of instable parameters. In a nut-shell, our findings are virtually robust.

4. Conclusion and Policy Recommendation

There is a plethora of studies which have investigated the dynamic effects of Volatile EXR on the trade of Pakistan to its trading partners. Some of these studies employ panel data to find empirical results. And, some studies endeavor to explore the EXR and trade nexus using

time series data. Further, both bunches deduce positive, negative and no impact of EXR volatility. However, all the ample body of literature on the concentrated topic of current study employ aggregated data which may be suspected for the exigency of aggregation bias (Bahmani Oskooee and Satawatanon, 2011).

Therefore, to account the problem aggregation bias and to get a more positive outcome, the current study focuses on employing the more disaggregated, viz, commodity wise data for the time span of 1982 to 2017. Further, we use ARDL technique to compute short as well as long-run results. Also, to check the long run dynamic relationship among variables, the current study uses the bound testing approach.

Applying bound testing technique, we explore that 24 out of 38 exporting industries possess co-integration. Also, out of 44 importing industries, 24 industries show the long run dynamics. However, the remaining industries do not maintain co-integration. After checking the co-integration, we apply ARDL Approach to attain short as well as long-run findings. In the short run, 18 industries, in export function, enjoy the benefit and 3 industries, on the contrary, face loss on account of volatility.

Further, the remaining industries do not show any response to the oscillations in EXR. While, there are 21 industries, in the import function, which show a positive reaction to the volatility. On the contrary, only four importing industries face loss. Now it can be inferred that the majority of exporting and importing industries as well do not suffer from loss due to the volatility in the short run.

Whereas the long run findings are concerned, they indicate that only importing industries face the loss. Since 21 importing industries get the loss, while Only four industries enjoy the benefit on account of volatility. On the other hand, only seven exporting industries response to the volatility in which 6 industries gain the advantage; however, one industry face loss. Intriguingly, the large share having industry coded as 724 enjoys the gain in the short run and show no response in the long term to the volatility. Considering the outcomes of the current study, the policymaker should do nothing with currency and let the currency, viz, rupee work according to market forces.

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Notes

Note 1. Stands for Exchange Rate.

Note 2. http://www.finance.gov.pk/

Note 3. http://www.commerce.gov.pk/

Note 4. China Pakistan Economics Corridor

Note 5. http://www.pide.org.pk/

Note 6. Another study by Serenis & Tsounis (2014) demonstrates that the exports of 3 African countries i.e. Malawi, Morocco & South Africa negatively respond to the volatility.

Note 7. Also Rutto & Ondiek (2014) finds the same findings in the case study of Kenya.

Note 8. http://wdi.worldbank.org/

Note 9. https://www.imf.org/

Note 10. https://wits.worldbank.org/

Note 11. These importing industries are coded as 231, 275, 292, 321, 611, 612, 633, 641, 651, 666, 679, 682, 684, 689, 694, 696, 714, 722, 724, & 861.

Note 12. The remaining 17 industries coded as 276, 283, 292, 541, 611, 654, 655, 656, 658, 659, 663, 698, 719, 841, & 861 do not respond to the volatility.

Note 13. And, this is the unique finding of our study.

Note 14. Their codes are 242, 611, 633, & 692.

Note 15. With share of 10%

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