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# Exchange Rate Volatility and Sectoral Trade: Evidence from Pakistan

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**ABSTRACT**

The study focused on the influence of exchange rate volatility (ERV) on imports and exports of various sectors and used annual observations ranging from 1982-2023. The study used data of GDPw, Real effective exchange rate (REER), different sector's imports and exports, along with commodity group import/export collected from World Development Indicator (WDI). All sectors are preferred by their contribution to total exports and imports and are considered the major sectors of the country. The study used annual observations to capture the volatility of the exchange rate by employing ARCH/ GARCH family models, and additional association was confirmed through ARDL / OLS and Engle Granger technique. ADF and PP tests suggested the ARDL methodology for the estimation process. ERV has a negative relation with agricultural, industrial, and manufacturing sector exports, as well as agricultural and manufacturing sector imports. It only shows a positive relation with industrial imports. According to results it is highly recommended that the new international markets should be focused because it provides the more opportunities to exporters that he could export in those countries whose exchange rate has minimum variations.

## Introduction

Exchange rate is considered an important policy variable in any open economy as it affects different macroeconomic variables like trade flows, capital flows and GDP. The policy makers realized that increase in exchange rate (ER) may lead to the competitive advantage in international trade. When there is an increase in exchange rate (ER) in any economy, the exportable domestic goods become cheaper as compared to its trading partners; creating a situation of increase in international demand of exportable domestic goods and decrease in imports from same country (Ejaz et al., 2021). Instability in exchange rate diminishes the trading activities because both the trading partners wish exchange rate (ER) to be more favorable. So, fluctuation in exchange rate (ER) not only disturbs the decision making of investors but also affects the volume of trade (Kafayat, 2013).

LDC's are more sensitive to the ERV in terms of its effects on foreign trade. The uncertainty of exchange rate adversely affects trade volume especially in LDC's due to lower level of financial development. Most of the developed and developing economies in now a day commonly used flexible exchange rate system (Shafique et al., 2022). An increase in volatility may lead to higher risk which can be avoided by hedging investment. The domestic prices of open economy like Pakistan are affected by external price shocks. These shocks can appreciate or depreciate exchange rate and change import prices. This appreciation or depreciation in currency will cause the change in price level of imported refined goods and imported inputs being used for domestic industry and it will surely affect the prices of final goods and services in local market. So the implementation of monetary policy also aims to promote growth and stabilization of currency values in developing economies (Shaikh and Hongbing, 2015).

In Pakistan, the imports have been growing rapidly than its exports due to different reasons leading to increase in trade deficit. During the past two decades, the economic growth of Pakistan improved resulting in the increase in level of investment and domestic demand for imports. Being a world's fifth populous country Pakistan has compelled to import huge quantity of commodities to feed its population. Though Pakistan basically produces agriculture products and also some raw materials but it has also relied on imports to manage its other requirements (Alam and Ahmad, 2011).

Conversely exports are supposed as an engine of economic growth. According to Pakistan Bureau of statistics, in the year of 2023 total exports amount US 25.3$ billion existed in Pakistan. To balance the spending on imports within a country, exports are playing essential character. Pakistan's exports comprised of few items but in Strategic Trade Policy Framework (STPF) 2020- 25, Pakistan has major goal to boost its exports with no element of duty and tax. According to STPF 2020-2025 the priority sectors are identified through international demand trends, capacity and capability of exports sector in Pakistan (Iqbal et al., 2022).

The empirical studies could not arrive at some agreed upon conclusion regarding the nexus between ERV and foreign trade. It depends upon the situation in which ERV has positive or negative impact on trade. Due to this reason the issue of ERV and its relationship with foreign trade remains debatable. The current study utilized the major import and export sectors (Agriculture, Industry and Manufacturing) to estimate the relation with ERV. The Pakistan's major export commodities are wheat which exported to UAE, Raw Cotton which exported to China and Citrus which exported to China. The import commodities which included by study are Wheat which imported from Italy and UAE, raw cotton which imported from USA and Brazil and sugar which imported from India, Brazil and UAE. To analyze the relationship between exchange rate volatility with imports and exports of Pakistan, this study will use data span starting from 1982 to 2023. The reason is that before 1982, Pakistan's economy was linked with US dollar and ER became flexible exchange rate system by delinking Pakistan's currency from US dollar. Most of the studies like Gul and Awan, (2017) also used the year 1982 as the starting year to examine the impact of exchange rate volatility on trade flows. The purpose of selection of Pakistan as debatable country is that Pakistan is developing economy and exchange rate is important factor to increase or decrease in imports and exports and data from previous few decades described high ups and downs in case of ER.

This research article is an effort to enhance the exposure in the field of international trade flow specially reference to Pakistan. The article tries to explore the impact of exchange rate volatility (ERV) on exports and imports of various sectors (Agriculture, industry and manufacturing) in Pakistan (sectoral analysis). The article organized the literature review in second section. Data and methodology are presented in third section, results and discussions are followed by fourth section. Fifth section comprised of commodity analysis.

## Literature Review

Many studies have examined the connection among ERV and trade flow for various regions and economies of the world over the past three decades. Studies also analyzed the influence of ERV on different macroeconomic variables. The majority of the research found a positive relation between ERV and import export variables, but some could not justify any association between them. The following paragraphs contain a review of existing literature in this area for different countries, including Pakistan.

Ahmad *et al.,* (2022) examined the unique relationship of ERV on imports and exports of four different Asian economies, namely Malaysia, Korea, Pakistan, and Japan. According to the linear model, there is no significant association between ERV and trade flows. It confirms no significant impact of ERV on Malaysian exports, especially in the long term during appreciation. But depreciation is expected to boost Malaysian exports. The nonlinear model clearly identified the significant impact of ERV on trade flows. Both linear and nonlinear models illustrated that depreciation will lead to an increase in both imports and exports.

Similarly some studies assessed the same impact on bilateral trade like Uzair *et al.,* (2022) analyzed the influence of bilateral ERV on the bilateral trade of 20 import and 9 export industries from Pakistan with China. The study has a mixed type of impact on exporting and importing industries. Only a few products are negatively impacted, and most have a positive association.

Ali and Khan, (2022) analyzed the behavior of rice producers affected by ERV in the country of Pakistan. There is appreciation in the ER that will surely be adversely affected to production of rice. The negative and significant relation among them ensures the evidence of risk averse behavior of rice producers.

Iqbal *et al.,* (2022) tried to explore the symmetric and asymmetric impact of ERV on trade activities between two economies, such as Pakistan and the USA. There is evidence of significant asymmetric impact of ERV on one half of the industries related to imports and exports of Pakistan during trade with the USA, especially in the long and short term as well.

Saqib *et al.,* (2021) focused on examining the ERV in the Pakistani rupee and its impact on monthly energy imports. The study contained different variables like crude oil, petroleum products, coal, electricity, inflation, FDI and remittances. The study concluded that there is existence of asymmetric impact for crude oil, coal, petroleum products and electricity in both short period and long period as well. The depreciation of the Pakistani rupee help to ensure imports of crude oil and electricity, but the appreciation effects were insignificant. The study reveals that ERV effects are sector-specific in Pakistan and are also asymmetric in nature.

Rahman *et al.,* (2021) estimated the unique relation between ERV and unemployment with some other related factors as explanatory variables like GDP, imports, and exports in the country of Pakistan. Research revealed the positive effect of ERV on unemployment in the long run. Similarly, the imports have 8% inversely affected the unemployment in the long term. To elaborate on the short-run analysis, exports and GDP have an inverse relationship with unemployment.

Few studies accounted disaggregated trade data especially in case of bilateral trade. One is Abbasi and Iqbal., (2021) investigated the bilateral ER along with third-country ER risk on Pakistani trade flows with its major trading associates. So, it is not only a specific evaluation but also an estimated third-country volatility impact. The study used the data (1982-2017) for countries like Pakistan, the European Union, the USA, China, the UAE, and Saudi Arabia. The study concluded that ERV has no effect on real exports, but in the case of third-country volatility (TVC), it was consistent in each trading partners. Second is Hassan and Aljarallah., (2021) clearly indicated that ERV has a significant impact on exports to the UK, USA, and Netherlands, but ERV has a significant impact on imports from the UK, China, and USA to Pakistan. There is an insignificant impact of ERV on trade volume in listed economies. The result of the positive influence of ERV on imports is not favorable. The other example of bilateral trade and ERV is Bahmani-Oskooee *et al.,* (2020) evaluated the trade flows and impact of ER between Pakistani rupee and Yuan volatility by using the data from the 14 Pakistani exporting and 34 importing industries of China. There is an asymmetric effect of ERV in the short term, almost in all industries, and an asymmetric effect in 40 to 50% industries in the long term. The study also elaborated that there is a more significant effect of volatility in the nonlinear model as compared to the linear model.

The few studies examined the same analysis by NARDL model to explain the asymmetric relationship. Bahmani-Oskooee *et al.,* (2020) explored the asymmetric impact of trade flows to the measure of ER uncertainty from Asian countries such as, Pakistan, Japan, China, Korea, Singapore, Malaysia, the Philippines, and India. Study applied linear and nonlinear model, i.e, ARDL and NARDL for estimation. The study concluded that there are more significant results of nonlinear NARDL. In some of the cases, there is no significant impact of ERV on trade flows, especially in the linear model, but in other cases, the results are totally opposite.

After reviewed all previous research studies the current research literature is going to take input in further detail of commodity and disaggregated trade data especially at sectoral and commodity level as well. Current study also tries to focus on different imports and exports policies for each trading partner instead of using a single trade policy to diminish the imports and boost up the exports. The contribution of the following study is to sketch out the diverse effects of ERV by using different export and import sectors and their commodity groups. The heterogeneity of currency behavior may also impact differently to ERV. The limitations mentioned above create the obvious gap that needs to be overcome by new research studies. There are further requirements to create a link among ERV and trade flows, especially by taking disaggregated trade data and utilizing a suitable methodology for time series analysis.

## Data and Methodology

### Data Description

Analysis about influence of ERV on the sectoral exports and imports of Pakistan, following literature utilized annual time series data set covered the time span 1982-2023. The major imports and exports sector data have been collected from World Development Indicator (WDI). The study used annual observations to capture volatility by employing ARCH / GARCH family models.

### Methodology

The current study applied ADF unit root tests to verify the results and overcome the shortcomings of the individual approach test. Commonly used tests to verify the stationarity of data are Augmented Dickey Fuller (ADF) analysis presented by economists Dickey & Fuller (1979) or Phillips-Perron analysis denoted by (PP) test presented by Phillips & Perron, (1988), and KPSS Kwiatkowski *et al.,* (1992). The tests mentioned above are helpful in identifying the order of integration.

ECM is a theoretically explained approach that is useful to analyze the short and long term properties of a time series together. It presents the speed of adjustment in convergence, from the last period's divergence for long run. The use of ECM was first introduced by Sargan (1964) and it was found that traditional analyses supposed the series to be stationary at level. But actually, all series were not found to be stationary and it available at different order integration.

When the series becomes stationary, after differencing, it will lead to the loss of long-run significant information. ECM is one of the solutions to this issue without losing long-run information. ECM approach is based on the Granger model. In simple terms, the variables have long-run co-integrated equilibrium and the ECM is helpful to explain that relationship. ECM is a direct method to measure the speed of the dependent variable as it returns to the equilibrium. Now the turn is to indicate the direction of relation among the estimators. The Granger Causality analysis is helpful to identify the direction and it can be performed in two ways, which mostly depends on the outcomes of linkage. If there existed a short-term relation between the estimators, then Granger Causality analysis may be applied under VAR model. Existence the long term relation between the estimators, then Granger Causality analysis may be applied under the VECM model. If no co-integration exists among the estimators, then Granger Causality analysis is suitable to apply. The existence of co-integration among estimators provides evidence that VECM is appropriate.

After estimating the short-term and long term analysis, there is necessary to evaluate the stability of parameters by applying CUSUM and CUSUMSQ tests. The current study will also apply the NARDL model in addition to time series methodologies described above to examine the symmetric or asymmetric impact of ERV on selected imports and exports of Pakistan.

### Construction of Model

According to the Keynesian theoretical framework, the most important factor that significantly impact the exports demand is the national income of the importing country. It is common evidence that the rise in the level of national income will enhance the purchasing power of domestic residents. It will go ahead with the enhanced demand for domestic and foreign goods. The given literature shows that an increase in the world's national income has a positive impact on the exports of the exporting country. The current literature will also utilize the GDP of the world to estimate its influence on the exports commodities of Pakistan, and this relation is expected to be positive. In the way to evaluate the effect of ERV on trade flows, this study used export model followed by (Bahmani-Oskooee & Hegerty, 2009) and (De Vita & Abbott, 2004).

$$\ln EXP_t = \alpha_0 + \alpha_1 \ln GDP_t + \alpha_2 \ln ERV_t + \alpha_3 \ln REER_t + \epsilon_t \qquad (1.1)$$

Equation 1.1 represents the export model of Pakistan, where EXP is dependent variable and shows the aggregate exports of Pakistan in t time period. The real exports of Pakistan depend upon the GDP (national income) of other trading partners, the volatility of the exchange rate (ERV), and the real effective exchange rate (REER). In dealing with aggregate exports, the GDP is taken as GDP (world). The t represents the time dimension, Ln represents the natural logarithm, and $\epsilon$ is concerned with the white noise disturbance term. The signs attached to these variables are concerned, and $\alpha_1$ is considered to be positive. It shows

that a rise in GDPw will go ahead to more exports of Pakistan because its partners will increase their imports as well. The rise in GDPw will also be helpful to enhance import-substitute goods, and the same economy may import in a lesser amount, consequently showing the negative α1(Bahmani-Oskooee, 1986).

The ERV could influence the exports in either way i.e., positive or negative. ERV α2 is considered to be positive or negative. It is also required to evaluate volatility in short and long periods separately. Finally, the REER α3 is considered to be positive. Rise in REER go head to the depreciation of Pakistan's currency. And this depreciation will boost Pakistan's exports. For imports, this study has followed the model by (Alam, 2010).

$$\ln IMP_t = \beta_0 + \beta_1 \ln GDP_t + \beta_2 \ln ERV_t + \beta_3 \ln REER_t + \mu_t \quad (1.2)$$

Equation 1.2 shows the import model of Pakistan, where IMP is the quantity of aggregate imports in Pakistan. The real import from other trading partners depends on the GDP of Pakistan, ERV, and REER. Following the same logic β1 is considered to be positive. It means that to boost the GDP of Pakistan, there will go ahead a rise in imports of Pakistan from other trading partners. β2 is considered positive or negative. Finally, β3 is supposed to be negative because an increase in REER leads to depreciation of the Pakistan rupee and will try to reduce the imports (Sercu & Vanhulle, 1992).

**Table 1 Variables of Model**

| Variables | Units of Measurement |
|---|---|
| Agriculture sector exports | % of merchandise exports |
| Industrial sector exports | % of merchandise exports |
| Manufacturing sector exports | % of merchandise exports |
| Gross Domestic Product World (GDPw) | Current US $ |
| Agriculture sector imports | % of merchandise imports |
| Industrial sector imports | % of merchandise imports |
| Manufacturing sector imports | % of merchandise imports |
| Gross Domestic Product of Trading partner (GDP) | Annual % |
| Real Effective Exchange Rate (REER) | 2010 = 100 |
| Exchange rate Volatility (ERV) | Measured by GARCH |

Source: World Development Indicator (WDI)

## Results and Discussion

The results of the table 2 explored the unit root test conducted for different import and export sectors. ADF test conducted to measure the level of stationary for agriculture sector exports, industrial sector exports and manufacturing sector exports. On the other hand measures the agriculture sector imports, industrial sector imports and manufacturing sector imports along with REER, ERV and GDP. Therefore, some have included the trend and some have included trend and intercept both.

**Table 2 Results of ADF Unit Root Test**

| | Level | | 1st Difference | |
|---|---|---|---|---|
| **Variables** | **T Static** | **Prob Value** | **T statics** | **Prob Value** |
| Agri Sector Exports | -1.0520 | 0.2593 | -4.9579 | 0.0014 |
| Industrial Sector Exports | -2.1948 | 0.2112 | -6.0496 | 0.0001 |
| Manu Sector Exports | -2.6435 | 0.2643 | -7.4743 | 0.0000 |
| Agri Sector Imports | -5.5596 | 0.0000 | | |
| Industrial Sector Imports | -2.0692 | 0.2576 | -5.6949 | 0.0002 |
| Manu Sector Imports | -2.1831 | 0.2153 | -5.7270 | 0.0002 |
| REER | -3.2525 | 0.0241 | | |
| ERV | -3.9007 | 0.0047 | | |
| GDP | -4.6718 | 0.0005 | | |
| GDPw | -1.6922 | 0.4274 | -5.1561 | 0.0008 |

Source: Authors Calculations

The unit root test for sectoral import and sectoral exports analysis illustrated that all the variables are integrated at I(0) and I(1) but no variable was found to be integrated at I(2). All the variables are integrated at I(1) instead of Agriculture sector imports, REER, ERV and GDP. It has clear indication that series were integrated at different level.

**Table 3 Results of Bound Test**

| Test Statistics | Value |
|---|---|
| F Stat Agri Sector Exports | 10.6652 |
| F Stats Industrial Sec Exports | 5.8169 |
| F Stats Manu Sec Exports | 6.7261 |
| F Stats Agri Sector Imports | ------- |
| F Stats Industrial Sec Imports | 4.4986 |
| F Stats Manu Sec Imports | 6.9883 |

Source: Authors Calculations

The results of F statistics from bound tests accessible in table 3. The estimated outcomes for agriculture sector export are 10.6652, for Industrial sector export is 5.8169 and manufacturing sector export is 6.7261. All the statistics are larger than upper bounds of F stats at 10%, 5% and 1% as well. It provides the confirmation of long run association and co integration among export sector estimators (Pesran *et al.,* 2001). The calculated value for industrial sector import is 4.4986, manufacturing sector import is

6.9883. All the statistics are larger than upper bounds of F stats at 10%, 5% and 1% as well. It provides the confirmation of long run association and co integration among import sector estimators **(**Soleymania & Chuaa, 2014). Agriculture sector imports calculated through OLS method.

**Table 4 Serial Correlation LM Test**

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 1 lag

| Model | F-statistic | Prob. Chi-Square(1) |
|---|---|---|
| Agriculture Exports | 0.1425 | 0.6222 |
| Industrial Exports | 0.0483 | 0.7683 |
| Manu Exports | 0.2095 | 0.4589 |
| Agriculture Imports | ---- | ----- |
| Industrial Imports | 0.0716 | 0.9114 |
| Manu Imports | 0.4293 | 0.3997 |

Source: Authors Calculations

Breusch Godfrey serial correlation LM test is applied to estimate the serial correlation among variables. The outcomes of the Probability Chi sq for agriculture sector exports is 0.62, for the industrial sector exports are 0.76 and for the manufacturing sector exports is 0.45. The results of the Probability Chi sq for industrial sector imports is 0.91 and for manufacturing sector imports is 0.39, that is larger than 5% level of significance. Durbin Watson test also identified the value of 2.0 which provides evidence of no autocorrelation in the series. CUSUM and CUSUMSQ tests are used to test the parametric stability. Both tests remain at 5% level of significance during the measurement of different import and export sect ors. It is evidence that the parameters of the estimated model stay stable during the whole sample period.

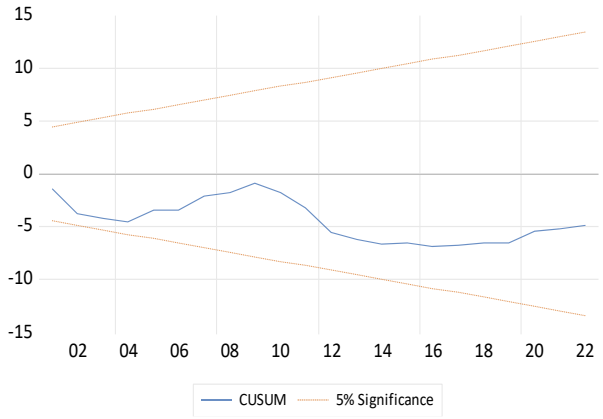


**Figure 1. CUSUM test for Agriculture Exports**

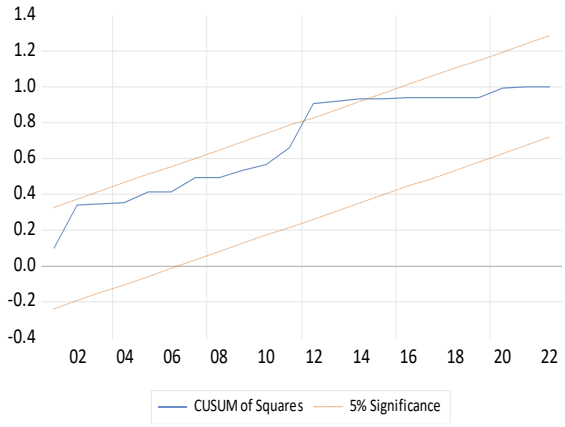


**Figure 2. CUSUMSQ test for Agriculture Exports**

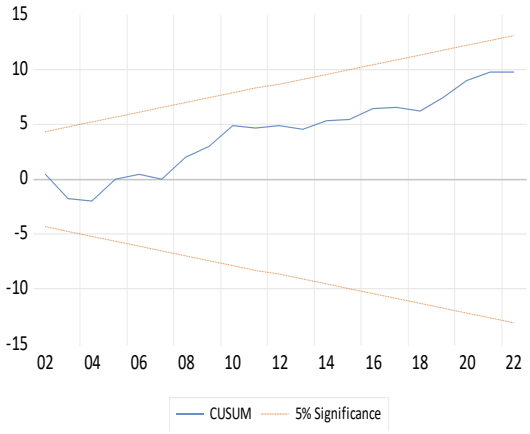


**Figure 3.CUSUM test for Industrial Exports**

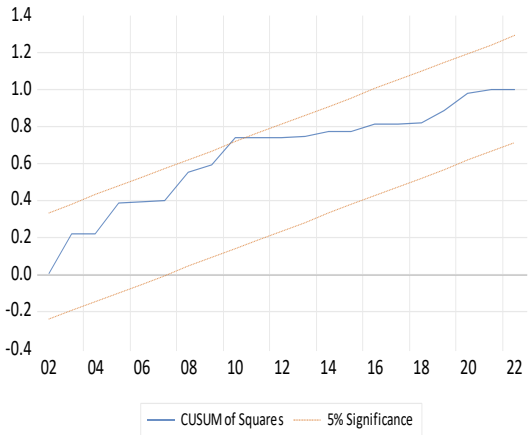


**Figure 4. CUSUMSQ test for Industrial Exports**

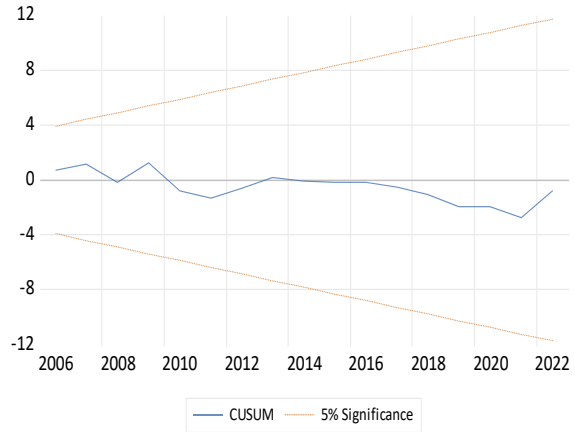


**Figure 5. CUSUM test for Manufacturing Exports**

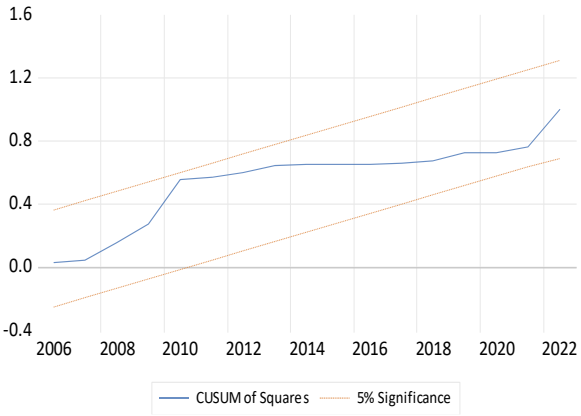


**Figure 6. CUSUMSQ test for Manufacturing Exports**

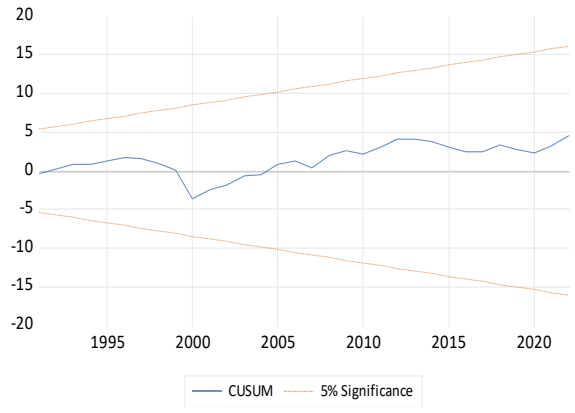


**Figure 7. CUSUM test for industrial Imports**

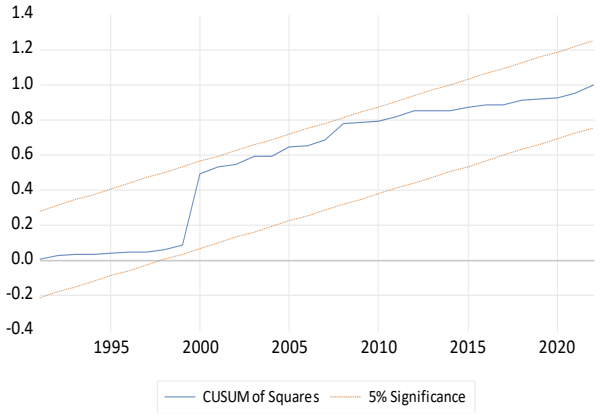


**Figure 8. CUSUMSQ test for industrial Imports**

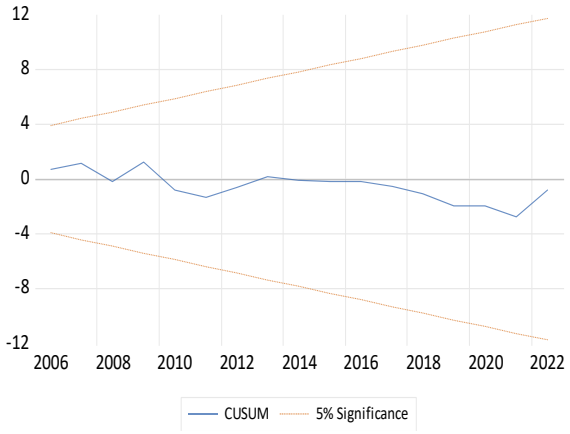


**Figure 9. CUSUM test for Manufacturing Imports**

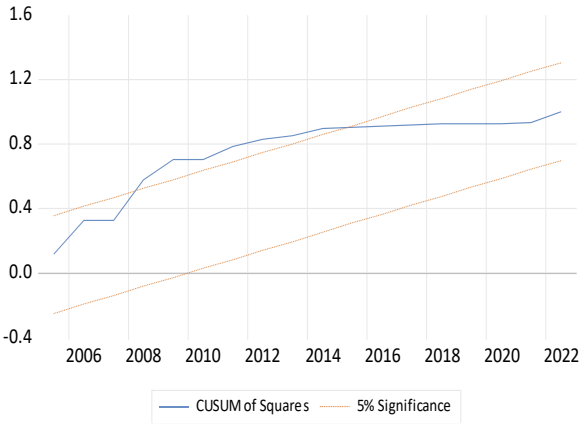

**Figure 10. CUSUMSQ test for Manufacturing Imports**

Source: Authors Calculations

**Long Run and Short run Dynamics for Sectoral Exports**

The long term association between estimators of sectoral export is evaluated by ARDL model. Table 5 explored long run outcomes for agriculture, industrial and manufacturing sector exports. GDPw has negative but significant relation with Pakistan's agriculture, industrial and manufacturing sector exports (Bahmani *et al.,* 2020). REER has positive and significant relation with agriculture, industrial and manufacturing sector exports **(**Nadeem *et al.,* 2025); **(**Bahmani *et al.,* 2020). Exchange rate volatility has negative and highly significant relation with agricultural, industrial and manufacturing exports. It means that the producers in Pakistan are generally risk-averse (Friday *et al.,* 2018). Our findings are consistent with Aftab *et al.*, (2012); Doğanlar. M (2010); Myint *et al.,* (2012); Sauer and Bohara, (2001); Ayobami, (2019); Hong and Zhang, (2018); Wang and Barrett, (2007) for Taiwan, Cho *et al.,* (2002) G-10 countries and Kandilov, (2008) on less developed and developed economies that all shows significant adverse impact of ERV on aggregate agricultural exports.

The significant impact in long period might be observed due to failure of exporters to hedge against long period hazard. These long term hazards might be expensive as compare to the short period hazard. The outcomes of study support stability in ER and improve TOT conditions. The outcomes would also facilitate agricultural products for exporters to confirm for short and long period hazard efficiently would be helpful (Friday *et al.,* 2018).

**Table 5 Long run Estimations and ECT for Sectoral Exports**

| Variables | Coefficient | Prob |
|---|---|---|
| GDPw Agri Exports | -0.0169 | 0.0000 |
| Exg Rate( Agri Exports) | 0.0010 | 0.0000 |
| Volatility(Agri Exports) | -0.0002 | 0.0165 |
| ECT(Agri Exports) | -0.6125 | 0.0000 |
| GDPw (Ind Exports) | -0.5209 | 0.0000 |
| Exg Rate (Ind Exports) | 0.0974 | 0.0000 |
| Volatility(Ind Exports) | -0.0431 | 0.0000 |
| ECT(Ind Exports) | -0.3253 | 0.0002 |
| GDPw (Manu Exports) | -5.5411 | 0.1952 |
| Exg Rate (Manu Exports) | 1.3826 | 0.0997 |
| Volatility (Manu Exports) | -0.0754 | 0.5848 |

| | | |
|---|---|---|
| ECT (Manu Exports) | -0.1434 | 0.0000 |

Source: Authors Calculations

When there is a long term association among estimators, the existence of an error correction representation may confirm. The outcomes of ECM represented the speed of adjustment reverse to long term equilibrium after a short term shocks. In Table 5 all models of sectoral trade regarding ECM is presented. Such ECM offers some additional support for complex and inconsistent relation among export import and its determinants in a dynamic way.

ECT values are -0.61, -0.32 and -0.14 respectively for agriculture, industrial and manufacturing sector exports which lies between 0 and 1 and has negative sign with highly significant nature. It means agriculture, industrial and manufacturing sector exports model to be convergent with 61%, 32% and 14% speed of adjustment towards long run equilibrium. ECM presents rate of adjustments of short period variations in long period association. The ECMt-1 coefficients are found to be negative and significant in our case and provide extra help for confirmation about equilibrium association among the estimators of study in long term (Aftab *et al.,* 2012).

**Table 6. Long run Estimations and ECT for Sectoral Imports**

| Variables | Coefficient | Prob. |
|---|---|---|
| GDP Agri Imports | 0.0682 | 0.5151 |
| Exg Rate( Agri Imports) | 0.0375 | 0.0000 |
| ERV (Agri Imports) | -0.0100 | 0.0001 |
| GDP (Ind Imports) | 2.8310 | 0.8906 |
| Exg Rate (Ind Imports) | -0.1437 | 0.8926 |
| ERV (Ind Imports) | 0.0169 | 0.8922 |
| ECT (Ind Imports) | -0.0180 | 0.0000 |
| GDP (Manu Imports) | 2.3868 | 0.0002 |
| Exg Rate (Manu Imports) | 0.2413 | 0.0000 |
| ERV (Manu Imports) | -0.0768 | 0.0173 |
| ECT (Manu Imports) | -1.0465 | 0.0000 |

Source: Authors Calculations

Results of long-run dynamics are reported in Table 6. Agriculture sector imports are measured by OLS methodology, where the GDP of Pakistan has positive but insignificant impact on agriculture, industrial, and manufacturing sector imports. The outcomes are consistent with Wang & Barrett, (2007); Aftab & Katper , (2017); Bahmani *et al.,* (2012); Soleymania & Chuaa, (2014); Adebanjo *et al.,* (2019). REER has a positive but highly significant relation with agriculture and manufacturing sector imports but a negative relation with industrial imports. ERV has a negative but significant relation with agriculture imports. ERV has a negative and significant relation with Agriculture and manufacturing sector imports, but a positive relation with industrial sector imports (Poloodo *et al.,* 2015); (Soleymania & Chuaa, 2014). Error correction values are -0.01 and -1.04 for industrial and manufacturing sector imports but these are significant in nature. It means that the agriculture, industrial and manufacturing

sector imports model converges towards long-run equilibrium with 1% and 100% speed of adjustment. Therefore, almost all the errors arising from the short-run disequilibrium are adjusted every year (Aftab *et al.,* 2012).

**Table 7. Granger Causality Results**

| Null Hypothesis | F-Statistic | Prob |
|---|---|---|
| GDPw does not Granger Cause Agriculture Exports | 5.8039 | 0.0068 |
| EXG does not Granger Cause Agriculture Exports | 0.8155 | 0.4509 |
| VOL does not Granger Cause Agriculture Exports | 0.2044 | 0.8162 |
| GDPw does not Granger Cause Industrial Exports | 0.8561 | 0.4337 |
| EXG does not Granger Cause Industrial Exports | 0.4411 | 0.6469 |
| VOL does not Granger Cause Industrial Exports | 0.3573 | 0.7022 |
| GDPw does not Granger Cause Manufacturing Exports | 0.6411 | 0.5329 |
| EXG does not Granger Cause Manufacturing Exports | 2.8754 | 0.0702 |
| VOL does not Granger Cause Manufacturing Exports | 1.0546 | 0.3598 |
| GDP does not Granger Cause Industrial Imports | 5.1873 | 0.0108 |
| EXG does not Granger Cause Industrial Imports | 0.9462 | 0.3982 |
| VOL does not Granger Cause Industrial Imports | 0.1487 | 0.8624 |
| GDP does not Granger Cause Manufacturing Imports | 1.0804 | 0.3508 |
| EXG does not Granger Cause Manufacturing Imports | 0.8582 | 0.4329 |
| VOL does not Granger Cause Manufacturing Imports | 2.6690 | 0.0843 |

Source: Authors Calculations

According to the Granger causality test there is a unidirectional short run relation between GDP and agriculture exports. But no short-term relation among ER and its volatility on agriculture exports is found (Friday *et al.,* 2018). In case of industrial sector analysis, the study doesn't found the presence of short-term association among the estimators. All probability values are larger than 5% and confirm the acceptance of null hypothesis. It means GDP, ER and ERV don't granger cause the Industrial exports in short term. In the case of manufacturing sector exports, no short run causality between different estimators is found. Only the exchange rate has bidirectional Granger causality with manufacturing exports (serenis *et al.,* 2011). According to the results in the case of imports, there is a unidirectional relation between GDP and Industrial imports. Exchange rate volatility also has a unidirectional relation with manufacturing imports. Other variables don't contain any relation in short run. Overall, the findings support the view of (Bahmani *et al.,* 2012).

## Conclusion and Policy Implications

The current study examined the effect of ERV on imports and exports of various sectors. The study used annual observations ranging from 1982-2023. Study collected the data for variables GDPw, Real exchange rate (RER), and different import and export sectors from the World Development Indicator (WDI). All sectors are preferred by their share in total exports and imports and are considered the major sectors of the country. The study employs ARCH/ GARCH family models to capture exchange rate volatility, and additional association is checked through ARDL / OLS and the Granger technique.

Findings of the ARDL Bound test revealed that all three sectors, agriculture, industry and manufacturing sector, have long-run co-integration with GDPw, REER, and ERV. The GDP world has a negative relation with all sectors, especially it has negative highly significant relation with the agriculture sector exports because Pakistan's agriculture sector exports are based on raw material. An increase in GDP the world's GDP will decrease the demand of Pakistan's exports in international markets from all sectors due to raw form of products like raw cotton and seeds exports. But in the case of imports, the GDP of Pakistan has a positive relation with all three sectors. With an increase in GDP of Pakistan, the domestic consumption capacity increased, which helps to import more products from the agriculture, industrial, and manufacturing sectors. REER has a positive influence on all three sectoral exports. An increase in REER leads to a decrease in the value of the domestic currency. Exports of Pakistani products automatically increased and created a positive link with REER. But in the case of imports, the agriculture and manufacturing sector imports increased instead of decreasing because agricultural imports are based on agricultural machinery and inputs, which are necessary for the growth of Pakistan's agriculture sector.

Manufacturing imports are highly supportive of our domestic industries. By an increase in REER, the prices of agriculture and manufacturing sector imports also increase, but the domestic demand will not decrease. REER has a negative relation with industrial import demand due to a high level of liquidity of plants. ERV has a negative and highly significant relation with agriculture and industrial exports. ERV has a negative but insignificant relation with manufacturing exports, which indicated that Pakistan's traders are risk-averse. The fluctuations in the exchange rate will decrease the future expectations regarding profit, which diminishes the demand for exports. Similarly, ERV has a negative and significant relation with agriculture and manufacturing sector imports but a positive relation with industrial sector imports. This negative relation exerted by a decrease in the value of domestic currency results in high import costs and more expensive imports in nature. Granger Causality analysis illustrated uni-directional causality among Agriculture sector exports and manufacturing sector imports with ERV, but no causal relation among ERV with other import and export sectors.

According to the estimation outcomes, some policy recommendations are suggested for the sustainable growth of the country's import and export.

- It is highly recommended that the new international markets should be focused because it provides the more opportunities to exporters that he could export in those countries whose exchange rate has minimum variations.
- Authorities should formulate some rules for controlling variations in exchange rate instead of using discretionary policy because unexpected variations in exchange rate could adversely affect the BOP and BOT.
- Pakistan also needs the diversifications and large number of value added products for exports to enhance the earning and reduce the deficit.
- Authorities should make some strict import policy to avoid unproductive imports inflow in the country.

These steps would help in promoting the volume of exports and reduction of imports which definitely help to reduce the deficit in BOP.

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