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Trade Openness as a Determinant of Sectoral Growth in Pakistan: A Time Series Analysis

^a Ismat Nasim, ^b Rashid Ahmad, ^c Furrukh Bashir, ^d Saba Noreen

^a Lecturer, Department of Economics, The Govt Sadiq College Women University, Bahawalpur, Pakistan
Email: Ismat.nasim@gscwu.edu.pk

^b Assistant Professor, School of Economics, Bahauddin Zakariya University, Multan, Pakistan
Email: rashidahmad@bzu.edu.pk

^c Assistant Professor, School of Economics, Bahauddin Zakariya University, Multan, Pakistan
Email: furrukh@bzu.edu.pk

^d MS Scholar, Department of Economics, The Govt Sadiq College Women University, Bahawalpur, Pakistan
Email: sabanoreen2013@gmail.com

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ABSTRACT

The current study aims to search the impact of trade openness on the three main sectors of Pakistan. This research work uses the time series data to obtain the empirics. The world Development indicators 2021 helps to gather the data from 1989 to 2021. Time series data handling starts with the checking the individual series and ADF test helps to identify the stationary. The mixed order of levels of integration recommended to use the ARDL to obtain the long run relations among the variables. The results reveals that the foreign direct investment is negative and significant in agriculture sector. For industrial sector it is positive and significant and same for services sector. Results indicates that the gross capital formation is significant and but negative in agricultural. Negative impact in industrial sector but significant means that capital is not utilized at its optimal level, while it is significant and positive in services sector. All these results indicate that the impact of trade is significant but the controlled variables show that for developing countries like Pakistan FDI and Capital formation divert it from agricultural economy and pushing it towards industrial economy.

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Corresponding author's email address: rashidahmad@bzu.edu.pk

1. Introduction

Trade liberalization and international barriers can create new challenges in the form of better openings along with some problems. New openings and global integration can open the doors of more and favorable markets, more foreign investors towards the country, flow of new and modern means of productions in the form of advance technology. These altogether bring advancement that flow from one country to other. These advancements become the source of development and it benefits the overall

economy. When the whole economy gets benefited then major macroeconomic issues can tend to go to solution like the inflation rate, unemployment, low living standards.

In the contemporary world, the global family is indorsing to leave behind the old means of growth and development of various sectors of an economy. One of the highlighted pointers for measurement of economic activity and performance is to give up the obsolete sectoral progression. When the highest contributing sector of the economy is accompanied with modern and latest tools and management then it will be reflected in the increasing standards of living.

The recent decline in the overall growth of sectors becomes a major macroeconomic problem and there is need of such measures that can eliminate the shocks in the country performance. 2020 is marked as largest declining year as all economic activities and all sectors are equally affected. Pakistan also faces the shocks of the pandemic that covered the whole globe. Although, the impact of trade collapse of 2020 is not same for all products in similar manner. Along with other challenges, COVID-19 pandemic devastates global economies. However, Pakistan takes some influenced policies and decisions like monetary and fiscal measures, smart lockdown, fast provision of vaccinations etc. under the supervision of National Command and Operating Center (NCOCC). Situation was under controlled by these timely decisions and implemented policies.

Real economic growth mainly consists of the sectoral growth of any economy. It is a universal reality that improvement in the growth of all sectors results in the form of better living standards and the decline in sectors growth accompanies many problems as high inflation, unemployment etc. An economy is standing on different sectors which are mainly grouped in three sectors agriculture, industrial and services sector (M. Tahir, 2019).

During initial years in Pakistan economic history, the contribution of agriculture sector to overall economic growth was larger than industrial and services sector, which decreased dynamically as compared to the others. The contribution to economic growth for Services sector 58.8%, industrial sector 20.30% and agricultural sector 20.90% share as per the economics Survey of Pakistan 2014-2015. Whereas these shares have decline by 19.1% for industry, 61.7% for services sector and 19.2% for agriculture sector as per the report of Pakistan Bureau of statistics. The analytic studies reveal that services sectors the main controlling factor of economic activities in Pakistan. In Pakistan, cumulative growth has maximum proportion of sectoral growth in agriculture, industrial and services sectors.

Pakistan depends directly and indirectly on agriculture sector because major portion of population residing in rural area. Therefore, sustaining agricultural growth is of critical importance. In Pakistan, it contributes about 23.13 percent of Gross Domestic Product (GDP) in 2021. Half of working force is employed in agricultural sector and it is a major foreign exchange earning source. According to economic report of (Pakistan, 2021), the improvement in the production of kharif crops like rice, sugarcane, maize etc. were estimated more than 8 million. Total estimated growth during current fiscal year 2021, reached 2.8 percent as compare to the pre-pandemic growth levels like 3.3% in 2020 and 0.6% in 2019 as per the report of Pakistan Bureau of Statistics.

Agriculture value added defines as net output of forestry, hunting and fishing, and cultivation of crops and livestock production, including the agriculture sector, after adding up all outputs and subtracting intermediate inputs. Government needs to make policies which improve the exports of wheat, cotton, rice, sugarcane, maize etc. However, in current year 2022, due to persistent hikes in the prices of agricultural crops like pulses, onions, potatoes, chilies and tomatoes etc. These crops have

also their contribution in economic productivity of agricultural sector positively and significantly. Present study used foreign direct investment, exports of goods & services and gross fixed capital formation and evaluate their impact on agriculture.

For economic growth industrial sector is most significant and important. Almost in all developed economies industrial sector is accounted for 3/4th of total exports. Industrial sector in Pakistan contributes 19.1% of GDP in which cotton textile based industries are being the major contributors. Cement, fertilizer, edible oils, sugar, steel, tobacco, chemicals, machinery and food processing goods etc. are the other main export industries.

COVID-19 leaves its impact on industrial sector of Pakistan as due to lockdown and government policies. Yet, with effective policies Pakistan has recovered its growth in industrial sector. However, 3.6 percent estimated growth has been observed in 2021 as per the recent report of Pakistan Bureau of Statistics, 2021). Industrial sector contributes most important role in trade. The government of Pakistan is emphasizing on privatization more as compared to public sector industrial units that may have its own cost and benefits. Different determinants have been under consideration in different studies, however present study discusses impact of exports, foreign direct investment (FDI) and gross net capital (K) on industrial growth.

Services sector is leading sector in developing countries and Pakistan is one of them, and have all the great features that can lead to high standard living. For developing economies like Pakistan, trade and services has the inverse relationship. The working population in Pakistan is estimated (Pakistan, 2021), 52.56 million but due to Covid-19 services sectors has not declined its performance and maintain its contribution in GDP. Its share in GDP is 61.4% in 2019 and 2020 and 61.7% in 2021. Growth of services sector has significantly increased from 0.6 in 2020 to 4.4% in 2021. Impact of foreign direct investment on services sector growth is most life-threatening in developing economies. Decline in the exports of services is the major cause of brain drain. Different determinants have been under consideration in different studies present study discusses the impact of exports, foreign direct investment (FDI) and gross net capital (K) on services sector growth.

The study of sectoral growth is including the agriculture sector, industrial sector and services sector as a whole that are collectively important for the GDP growth. The objective of the study is to analyze the influence of trade that uses the proxy by trade openness on sectoral growth.

2. Literature Review

The crucial debate over the impact of trade on sectoral growth revolves around different aspects and different views. Many of them merge sectoral growth with economic growth but some differentiate sectoral growth and economic growth.

Nasim et al (2021) conducted a study to investigate the trade effects on services sector. The sample of some developing countries were taken and panel data methodology was applied. The empirical findings suggested that trade openness played its positive role in determination of services sector value addition. The researchers suggested to increase the quality of services products so that exports can be increased and in turn trade can play its role as encouraging factor for services sector productivity.

Bashir et al (2020) shed light on the influence of energy, inflation and capital formation in order to determine the industrial development in developing countries. The developing countries were further classified into sub-groups and found that inflation was causing to decrease the industrial development in high-income, middle-income and low-income nations. Whereas the energy was an encouraging element of industry in middle-income countries only.

While discovering the impact of trade on agriculture sector Nasim and Chaudry (2020) concluded in the study that trade was a boosting element for agriculture sector. However, the quality of agriculture goods needed to be improved with better and advance tools and ingredients.

Tahir et al.(2019), had researched the nexus of trade-growth during the past few decades and explored all the sectors of some developing countries. The study explored the impact of trade openness on three main sectors of economy. The researchers had results that revealed the positive impact of trade openness on agriculture and industrial sector while negative on services sector. The policy suggestion presented in the paper is a bit contradictory as the authors made an argument to discourage the services sector trade and just to focus on sectors with positive impact of trade.

Ajmair (2018), had checked the most relevant determinants of agriculture sector growth in Pakistan by using the time-variant parametric approach. The author took the data from 1976 to 2014 and applied regression to estimate the coefficients of independent variables to support of Kalman approach. The results depicted the picture where the effect of gross capital formation, permanent-cropland were on the negative side and gross national expenditure was on positive side of agriculture sector.

Ajmair (2017), verdicted out the relevant macroeconomic determinants of service growth in Pakistan that had followed by the time-varying parametric approach and applied the rolling regression estimation technique. The final results showed that inflation (CPI) had the negative and significant effect on sector growth. But the direct and significant effect of net FDI and gross national expenditure on sector growth.

Rehman and Bashir (2015) presented a study on agriculture sector that had energy consumption as basic determinant in middle-income developing-countries. Levin, Lin and Chu test for unit root was used to test the integration order and due to mixed order, the Panel ARDL technique was applied. The bound test validated the long run positive effect of energy consumption on agriculture. The policy suggested that if developing countries had aim to increase the agriculture productivity then energy conservation policies should not be adopted.

Faridi et al. (2015) investigated the anticipated relation between foreign inflows and sectoral output. The time series data was used of Pakistan ranged 1972-2013. The direct relation was found between the main variables of the study. The study also followed by some diagnostics to check the basic econometric problem that can be appeared in time series analysis and model was found without the problem of autocorrelation and any misspecification issue.

3. Components of Sectoral Growth

To analyse the trade impact on sectoral growth in Pakistan is the main objective of the study. The sectoral growth is divided into three main sectors: agriculture, industrial and services sector.

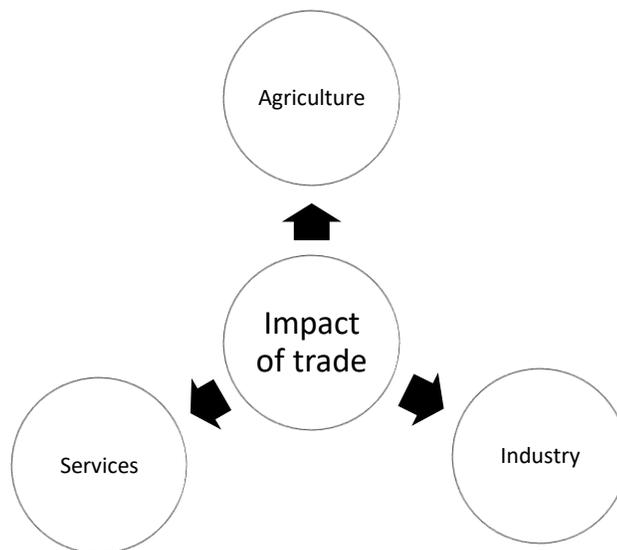


FIGURE 1: IMPACT OF TRADE ON 3 SECTORS IN PAKISTAN

4. Determinants of Trade:

The determinants of sectoral growth can be shown by the main explanatory variable trade openness along with some controlled variables that are :

- Exports of goods and services
- Foreign direct investment
- Gross net capital formation

The sectoral growth and its relationship with set of independent variables can be modeled as per the figure 2. Figure 2 is presenting the research framework of the study in three sub models.

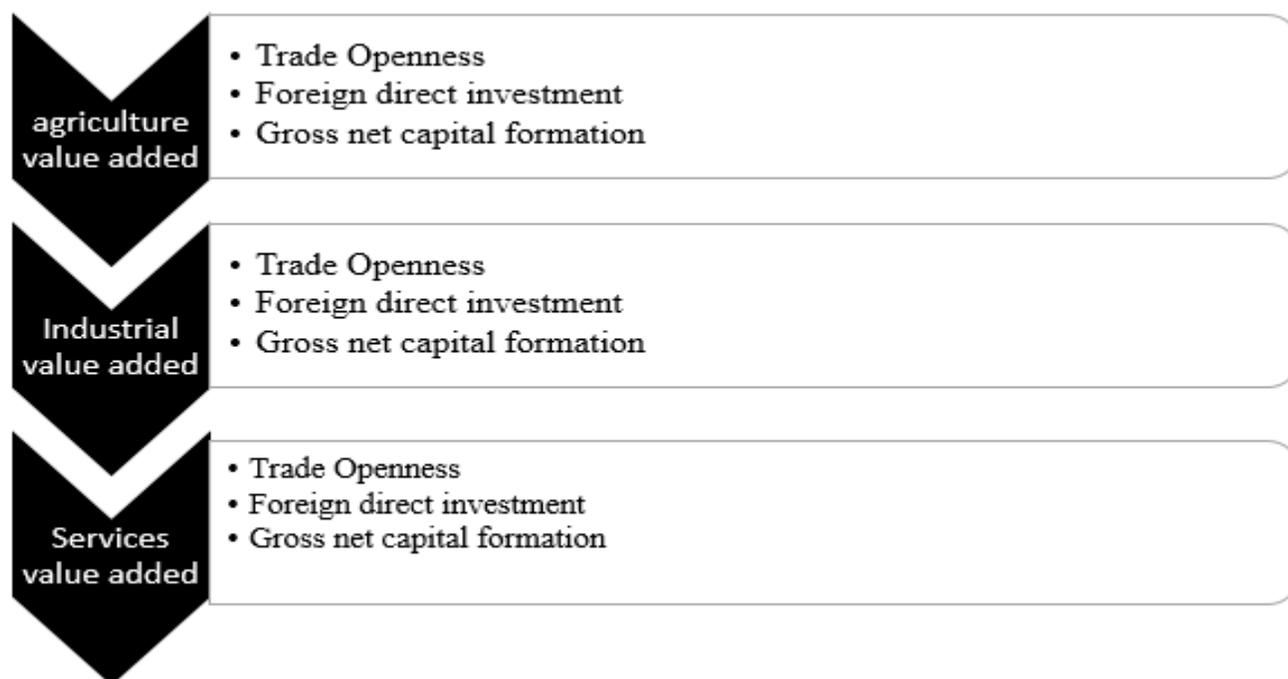


FIGURE 2: RESEARCH FRAMEWORK OF IMPACT OF TRADE ON SECTOR GROWTH IN PAKISTAN

5. Data & Methodology

In this section of study describes the detail of data description, data sources, data type, range of data, definitions of variables, estimation methodology and model specification used in it.

5.1 Data Description:

For the validation the impact of trade openness on sectoral growth the time series data is taken from World Development indicators (WDI) over the period from 1989 to 2021.

5.2 Variable Description

Three models are estimated by taking following variable as Dependent Variable in each model.

- Agriculture value added
- Industrial value added
- Services value added

Following three independent variables are used in the study

- Trade Openness
- Foreign Direct Investment
- Gross capital formation

5.3 Model Specification

Following models are specified accordingly:

➤ Model for Agriculture sector

Agriculture value addition

$$= f\{\text{Trade Openness, Gross Fixed Capital Formation, Foreign Direct Investment}\}$$

$$LAGVA = \beta_0 + \beta_1 TRD + \beta_2 LK + \beta_3 FDI + u_i$$

➤ Model for Industrial sector

Industrial value addition

$$= f\{\text{trade openness, Gross Fixed Capital Formation, Foreign Direct Investment}\}$$

$$LINDVA = \beta_0 + \beta_1 TRD + \beta_2 LK + \beta_3 FDI + u_i$$

➤ Model for Services sector

Services Value addition

$$= f\{\text{trade openness, Gross Fixed Capital Formation, Foreign Direct Investment}\}$$

$$LSERVD = \beta_0 + \beta_1 TRD + \beta_2 LK + \beta_3 FDI + u_i$$

6. Test & Estimation

For estimation, the study is employed Unit Root Test, ARDL Approach to find the results.

6.1 The Unit Root Test

Unit Root Test is used to assess the stationary behavior of the time series variables using the Augmented Dickey Fuller (ADF). The importance of the unit root test is to determine the order of integration before identifying any possible long run relationship among time series variables. The results of the ADF unit root test is provided in TABLE 1.

Table 1: ADF Test Results

| Variable | Order Of Integration | t- Statistics | Probability | Interpretations |
|-----------|-----------------------|---------------|-------------|-----------------|
| LAGVA | Level | -2.242644 | 0.0162 | I(0) |
| LSERVD | 1 st diff. | -4.957619 | 0.0004 | I(1) |
| LINDVA | 1 st diff. | -6.431608 | 0.0000 | I(1) |
| LTRD | Level | -5.138037 | 0.0002 | I(0) |
| FDI(%GDP) | 1 st diff. | -3.714017 | 0.0088 | I(1) |
| LK | 1 st diff. | -3.932816 | 0.0052 | I(1) |

The ADF unit root results show in table 1 that the agricultural value added (LAGVA) and trade openness are stationary at levels by including intercept. While services value added, industry value added, net foreign direct investment and gross fixed capital formation are stationary at first difference by including intercept. As variables are stationary at mixed level so study applies ARDL approach.

6.2 ARDL Bounds Testing Approach

This study continues by testing the long run relationships between the examined variables using the ARDL approach (Autoregressive Distribution Lag) which developed by Pesaran et al.

Table 2: ARDL Bounds Test

| Sector | F- Statistic Value | K |
|-------------|--------------------|---|
| Agriculture | 3.25175** | 3 |
| Industry | 7.041472*** | 3 |
| Services | 4.175813** | 3 |

**statistically significant at 5% level.

***statistically significant at 1% level.

After checking unit root test ARDL Bound Test is applied to check the presence relationship long-run among the selected variables in three models. The first model is where agricultural value added is explained by trade openness, net foreign direct investment and gross fixed capital formation. The value for F-statistic is 3.25175 with total of three parameters which is significant at 5% level of significance. The value for F-statistic is 7.041472 with total of three parameters which is significant at 1% level. The value for F-statistic is 4.175813 with K=3 and significant at 5%. The values of F-statistic indicate that relationships among variables of this study exists in long run in three models.

6.3 Agriculture ARDL Long Run Results

Table 3: Agriculture ARDL Long Run Result

| Long Run Coefficients | | | | |
|-----------------------|-------------|------------|-------------|--------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| LTRD | -0.00861 | 0.003134 | -2.74636 | 0.0226 |
| FDI | -0.04339 | 0.018076 | -2.40058 | 0.0399 |
| LK | -0.18077 | 0.057041 | -3.16909 | 0.0114 |
| C | 8.349997 | 1.579246 | 5.287332 | 0.0005 |

Table # 3 represents the long run results of agriculture ARDL. Considering trade openness, the results reveal that in agricultural sector, it has significant negative impact in long-run. It can be interpreted as one-percent increase in trade openness will lead to 0.86% decrease in agriculture in Pakistan in long-run. Second variable foreign direct investment shows the significant but negative impact on agriculture in long run. That means, one-percent increase in foreign direct investment will lead to 4.339% decrease in agricultural value added. Or higher the foreign direct investment can lower the agricultural value added. The last variable of the equation is gross fixed capital formation, the results reveal that in long run gross fixed capital formation in agriculture is significant and negative impact on agriculture. It means that one percent increase in gross fixed capital formation leads 18.07 percent decrease in agricultural value added. Another way to express the results, higher the gross fixed capital formation will lower the agriculture value added.

6.4 Agriculture ARDL Short Run Results

Table 4: Agriculture ARDL Short Run Result

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|------------------|-------------|------------|-------------|--------|
| D(LAGVA(-1)) | 1.0135 | 0.447743 | 2.263579 | 0.0499 |
| D(LAGVA(-2)) | 0.208895 | 0.279561 | 0.747224 | 0.474 |
| D(LTRD) | -0.00085 | 0.001288 | -0.65649 | 0.5279 |
| D(LTRD(-1)) | 0.003178 | 0.001229 | 2.586867 | 0.0294 |
| D(LTRD(-2)) | -0.00062 | 0.001299 | -0.47769 | 0.6443 |
| D(FDI(%GDP)) | -0.02034 | 0.02268 | -0.89676 | 0.3932 |
| D(FDI(%GDP)(-1)) | 0.067622 | 0.024529 | 2.75687 | 0.0222 |
| D(FDI(%GDP)(-2)) | -0.05756 | 0.027072 | -2.12613 | 0.0624 |
| D(LK) | -0.07384 | 0.148867 | -0.49603 | 0.6318 |
| D(LK(-1)) | 0.059828 | 0.216313 | 0.276581 | 0.7883 |
| D(LK(-2)) | 0.236155 | 0.18678 | 1.264348 | 0.2379 |
| CointEq(-1) | -0.8987 | 0.484554 | -1.8547 | 0.0966 |

Table#4 displays the short run results of agriculture ARDL along with short-run factors, standard errors, and t-statistic and probability values. In short- run, without lagged-terms, trade openness, and gross fixed capital formation are negative with agricultural value added while their lagged terms are positive with agricultural value added. Foreign direct investment is negative as well as positive with agriculture value added. Since the most important of all is the negative Error Correction term, which shows that the convergence of short-run results would be tend towards long-run equilibrium results if there any disequilibrium or shock could happen in the short-run.

6.5 Industrial Sector

Table 5: Industrial ARDL long-run results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|------------|-------------|------------|-------------|--------|
| LTRD | 0.048795 | 0.019011 | 2.566643 | 0.0247 |
| LFDI(%GDP) | 0.037739 | 0.035919 | 1.050672 | 0.3141 |
| LK | -0.43147 | 0.076816 | -5.61687 | 0.0001 |
| C | 15.05657 | 2.142355 | 7.028045 | 0.0003 |

In table#5, results of ARDL long run are presented. The results disclose that trade openness in industry is significant factor and gives direct impression on industry in long-run. It can be concluded that 1% increase in trade openness will lead to 4% increase in industrial output in Pakistan in long-run. Second variable foreign direct investment shows the significant and positive impact on industry in long run. That may be concluded that 1% increase in foreign direct investment will lead to 3% increase in industry value added. Or higher the foreign direct investment increases the industrial growth. The last variable of the equation is gross fixed capital formation, the results reveal that gross fixed capital formation is significant factor and gives the negative impression on industry in long run. That means 1% increase in gross fixed capital formation leads 43% decrease in industrial growth. Another way to express the results, higher the gross fixed capital formation will lower the industrial growth.

6.6 Industrial ARDL Short Run Results

Table 6: Industrial Short Run Results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-------------------|-------------|------------|-------------|--------|
| D(LINDVA(-1)) | 0.227821 | 0.165287 | 1.378336 | 0.1933 |
| D(LTRD) | 0.002109 | 0.007799 | 0.270372 | 0.7915 |
| D(LTRD(-1)) | -0.02546 | 0.007038 | -3.6168 | 0.0035 |
| D(LFDI(%GDP)) | 0.047802 | 0.025039 | 1.909118 | 0.0804 |
| D(LFDI(%GDP)(-1)) | -0.06372 | 0.025893 | -2.46096 | 0.03 |
| D(LFDI(%GDP)(-2)) | 0.013239 | 0.027161 | 0.487418 | 0.6347 |
| D(LK) | -0.1775 | 0.141066 | -1.25824 | 0.2322 |
| D(LK(-1)) | -0.46079 | 0.168188 | -2.73974 | 0.0179 |
| CointEq(-1) | -0.88759 | 0.215556 | -4.11765 | 0.0014 |

Table #6 the short- run results of ARDL are presented with short-run coefficients, standard errors, t-statistic and probability values. In the short-run, without lagged terms, trade openness, and gross fixed capital formation are negative with industrial value added while their lagged terms are positive with industrial value added. Foreign direct investment is negative as well as positive with industrial value added. Negative Error Correction term that shows that convergence of short-run results will tend towards long-run results if there any disequilibrium or shock could happen in the short-run.

6.7 Services Sector

Table#7: Services Sector ARDL long run results

| Long Run Coefficients | | | | |
|-----------------------|-------------|------------|-------------|--------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| LTRD | 0.320298 | 0.151898 | 2.108639 | 0.0587 |
| FDI(%GDP) | 0.425167 | 0.25788 | 1.648701 | 0.1274 |
| LK | 5.566693 | 0.679307 | 8.194666 | 0 |
| C | -125.633 | 19.08741 | -6.58197 | 0 |

Table#7 is showing the long-run results of ARDL. The results reveal that trade openness in services sector is significant and positive impact on services sector in long-run. It can be explained and interpreted as 1% increase in trade openness will increase by 32% e in services output in Pakistan in

long-run. Second variable foreign direct investment shows the significant and positive impact on services in long-run. That may be inferred that 1% increase in foreign direct investment will lead to 42% increase in services value added. The last variable of the equation is gross fixed capital formation, the results reveal that gross fixed capital formation in services is significant variable and gives the positive impression on services in long-run. That means 1% increase in gross fixed capital formation leads 556% increase in service growth. Another way to express the results, higher the gross fixed capital formation will higher the growth in services sector.

6.8 Short Run Results of Services Sector ARDL

Table o8: Services Sector ARDL Short Run Results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|------------------|-------------|------------|-------------|--------|
| D(LSERVD(-1)) | -0.414809 | 0.242702 | -1.70913 | 0.1155 |
| D(LSERVD(-2)) | -0.328629 | 0.199175 | -1.64995 | 0.1272 |
| D(LTRD) | 0.000506 | 0.012807 | 0.039548 | 0.9692 |
| D(LTRD(-1)) | -0.011294 | 0.014157 | -0.79776 | 0.4419 |
| D(LTRD(-2)) | -0.026367 | 0.01393 | -1.89274 | 0.085 |
| D(FDI(%GDP)) | -0.005944 | 0.024356 | -0.24403 | 0.8117 |
| D(FDI(%GDP)(-1)) | 0.015319 | 0.041479 | 0.369324 | 0.7189 |
| D(FDI(%GDP)(-2)) | -0.04816 | 0.0287 | -1.67804 | 0.1215 |
| D(LK) | 0.797296 | 0.352404 | 2.262447 | 0.0449 |
| D(LK(-1)) | 0.282189 | 0.366116 | 0.770763 | 0.4571 |
| D(LK(-2)) | 0.184788 | 0.446099 | 0.414232 | 0.6867 |
| CointEq(-1) | -0.164265 | 0.064654 | -2.5407 | 0.0274 |

In table#o8 with short run results of coefficients, standard errors, and t-statistic and probability values are expressed. In the short-run, without lagged terms, trade openness, and gross fixed capital formation are negative with services value added while their lagged terms are positive with services value added. Foreign direct investment is negative as well as positive with services value added. Error Correction term is negative which shows that the short-run results would be converged towards long-run results if there any disequilibrium or shock could happen in the short-run.

7. Conclusion

The results indicate that trade openness is significant but negative impact in agricultural because Pakistan exports are mainly primary agricultural goods not the final goods. trade openness industrial sector while it significantly and positively affects the services sector.

The results reveals that the foreign direct investment is negative and significant in agriculture sector, the reason behind is that foreign direct investment is enhanced the means of productions not the products quality as well as the storage of agriculture goods, which may cause the damage of output. For industrial sector it is positive and significant and same for services sector. According to the results of the study, it indicates that the gross capital formation is significant and but negative in agricultural because capital formation does not increase the output of agriculture in Pakistan. Negative impact in industrial sector but significant means that capital is not utilized at its optimal level, while it is significant and positive in services sector.

All these results indicate that the impact of trade is significant but the controlled variables show that for developing countries like Pakistan FDI and Capital formation divert it from agricultural economy and pushing it towards industrial economy. The negative impact of trade openness on the host country's sectoral growth, is a serious indicator which shows that there is some international constraints in trade as well as national issues like quality of final goods, low productivity etc. which may be the reason of low sectoral growth with rapid changes in trade.

Based on these findings, it is recommended that gross capital formation motivate investors to make investment in agriculture, industrial and services sector. Pakistan should improve the quality of final goods to increase the volume of exports, and try to use the capital at its optimal level. Government should take attention on the quality of agricultural exports and must take action to reduce the foreign investment in agriculture as its low efficiency. Agricultural final goods should be exported instead of in a raw form. Government should establish more technical/research institutes in order to enhance research and development in all three sectors. Government should advise all commercial banks to issues long-terms and short-terms loans to farmer, entrepreneurial and small industrial at low interest rate and make sure that the issued loans are utilizing in the said usages.

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