



DEINDUSTRIALIZATION AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM PAKISTAN



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ABSTRACT

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For the last four decades, ratio of services sector to economic growth has been increased among several developing countries. Like other developing economies Pakistan also experienced similar trends i.e. the share of services sector in Gross Domestic Product has expanded as compared to agriculture sector whereas manufacturing sector share remained stagnant. This situation is basically named as deindustrialization by some economists. In this context, present research tries to find out empirically the effects of deindustrialization on economic growth of Pakistan using time series data set ranging from 1972 to 2017. Auto Regressive Distributed Lag modelling technique has been used for estimation of the model. Empirical findings verified the fact that manufacturing value added has positive and significant impact on economic growth. The key finding suggested that Pakistan became a service economy without having proper experience of industrialization hence indicating deindustrialization in Pakistan. It is also concluded that Pakistan requires introducing such policies that encourage manufacturing sector growth as well as agriculture sector by curbing services sector. The study suggests that services sector should be prompted but not at the cost of manufacturing sector. This will render the growth journey of the country smoother and sustainable.

Contribution/ Originality: This study contributes in the existing literature on Deindustrialization for Pakistan. This study documents that services sector should be prompted but not at the cost of manufacturing sector. This study contributes in finding that deindustrialization process cannot be reversed in Pakistan without curbing services sector share.

1. INTRODUCTION

In several ways, modern world is the outcome of industrialization as productivity growth in Europe and United States sustained due to industrial revolution and categorized world in rich and poor nation classes. Some non-west countries joined with the west through industrialization. Industrialization has changed the world in both economic and social ways. It raised urbanization and created new behaviours. It created working and industrial class. Trade unions and political movements started due to industrialization, which has changed the traditional agrarian economy (Rodrik, 2016). Transition from agriculture to industry started in England in 1800 and mirrored in west generally and fluctuate from industries to services is obvious in developed countries (Fuchs, 1968).

Industrialization is longstanding bulletin for advanced world. Industrial movement is intensely linked with economic growth (Lawrence and Edwards, 2013). Now in the post-industrial era countries are facing the problem of deindustrialization i.e. developing countries are turning into service economies without having gone through a proper experience of industrialization. A trend of less employment share of manufacturing output to GDP (Rodrik, 2016). Manufacturing value added share in GDP has been decreasing in developing economies for past two decades indicating deindustrialization (Haraguchi *et al.*, 2017).

Developing countries are experiencing at a much lower level of per capita income than witnessed in history of today's advanced countries during their era of industrialization, signals of deindustrialization (Dasgupta and Singh, 2006).

Having an overview of Pakistan economy, there is an evidence of stagnant manufacturing sector. Agriculture value added is decreasing and services value added is increasing while manufacturing value added is almost on the same pace and shows stagnant behaviour. Following table 1 shows sectoral value added share of Pakistan economy each after ten years of gap from 1969-70 to 2014-15.

Table-1. Sectoral share percentage of GDP

Period	Agriculture output	Manufacturing output	Service output
1969-70	38.9	16.0	38.4
1979-80	29.8	14.5	44.6
1991-92	26.2	17.8	47.9
1999-00	25.9	16.8	49.0
2009-10	22.0	13.6	56.9
2014-15	20.9	13.3	58.8

Source: Various versions of Economic Survey of Pakistan.

This table clearly indicates that structure of Pakistan economy changes from agriculture sector to service sector without the channel of manufacturing sector. This picture is in line with (Hamid and Khan, 2015) that declining manufacturing value added indicates that Pakistan is on the edge of deindustrialization.

Generally, economic performance of any country is vastly associated to growth, share and value addition of various sectors. In this regard present study is commenced to compute the role of three major sectors i.e. agriculture, manufacturing and services with special focus on stagnant manufacturing sector and its role behind unsustained growth in Pakistan, which generates an important phenomena of deindustrialization in an emerging economy like Pakistan. So, the study aims to investigate the impact of deindustrialization on economic growth in Pakistan.

The framework of following research work is organized into five major sections. The first section provides a brief introduction that includes background, objective and hypothesis of the study. Section 2 provides review of literature that includes different sectors of the economy while Section 3 consists of data and methodology including theoretical framework, econometric model, data source and construction of variables. Estimation technique and interpretation of empirical results are presented in section 4. Section 5 includes conclusions and policy recommendations.

2. LITERATURE REVIEW

As discussed earlier, it is commonly opinioned that higher the manufacturing sector's output, higher will be the economic growth in an economy as advancement in new technologies and production specialization linked with this sector. Research work on deindustrialization shows different opinion and different results for developed and developing economies.

Singh (1977) pinpointed a structural instability in the United Kingdom and refers deindustrialization a problem because it exhibits manufacturing sector inefficiency. In OECD countries, share of manufacturing employment has

decreased from 28 percent in 1970 to 18 percent in 1994. Deindustrialization is not a negative phenomenon but it is rather natural result of course of development in previously industrialized country (Ramaswamy and Rowthorn, 1997). Shifting preference arrangements among manufactures and services, the quicker productivity growth of manufacturing as parallel to services and downward movement of manufacturing prices are responsible internal factors. The productivity of services leads to adjust additional share of employment and consequently prompt manufacturing productivity growth has decreased share of total employment (Rowthorn and Ramaswamy, 1999).

Pieper (2000) analyzed deindustrialization and social and economic sustainability nexus in developing countries. The study captured trend over time and data series for sectoral output, employment and productivity were divided into two periods i.e. 1975 to 1984 and 1985 to 1993. The cross-country sectoral value added data was composed of agriculture, industry (manufacturing), industry services and other services and developed accounting framework i.e. changes in productivity into sectoral shift of output and changes in employment structure. Deindustrialization here is defined as output and employment losses of industrial (manufacturing) sector relative to the rest of economy. Moreover, loss in industrial output is named as output deindustrialization by the same author. It concludes that some countries share same pattern of structural economic dynamics particularly with regard to industrial sector development.

Most of the low income countries facing de-industrialization and reform program flopped to increase private investment in manufacturing sector (Shafaeddin, 2005). The evidence of deindustrialization in some middle-income developing countries had been reported in terms of manufacturing employment to GDP per capita (Palma, 2005). Dasgupta and Singh (2005) tested pre mature deindustrialization in developing countries using Kaldorian contextual and clearly indicated that industry remained serious in economic development but many services including ICT make significant impact in many developing countries like India. There is evidence that manufacturing share of GDP is declining and there is increasing trend in services sector describing considerable pace of deindustrialization in OECD economies (Nickell *et al.*, 2004).

The subsequent stream of literature centered on different factors responsible for deindustrialization. Trade liberalization increases deindustrialization as it has negative impact on manufacturing employment in developed economies (Saeger, 1997; Kollmeyer, 2009). But former concluded that even balanced trade among OECD economies with developing countries results in contraction of manufacturing employment among OECD economies causing deindustrialization in developed countries, and later concluded two more factors including global trade (rising consumer propensity to demand services rather than manufacturing good and faster manufacturing sector productivity growth than others) are generating deindustrialization in advanced economies. According to Tregenna (2011) a general tendency towards the decline in manufacturing and a relative increase in services sector, predominantly in the case of employment and international value added.

Trade liberalization encourages the growth of manufacturing employment in China (Wang *et al.*, 2007). But opposite to this argument a similar analysis by David *et al.* (2013) reveals that increasing imports from China resulted decreasing manufacturing employment as well as reduction in wage rate in US economy. Almost same conclusions suggested by Lawrence and Edwards (2013) which states that increasing imports is the key factor behind declining share of manufacturing concerning US economy. They also argue that this impact of deindustrialization in US is not exceptional but the reducing manufacturing employment share is in all advance economies. They concluded that business cycles have impact on manufacturing employment so overall economic recovery will leads to manufacturing recovery. Also cheaper energy cost will result in boosting up some industries. In long run, reducing the trade deficit and broad based economic recovery will lead to increase in employment for less skill US workers.

Talking about deindustrialization and balance of payment, Rowthorn and Coutts (2013) concluded that trade with low wage is main factor responsible for current de-industrialization in many industrialized countries. Also trade balance in manufacturing has been decreasing trend showing current account deficit, which shows that decline

in balance of payment has improved by improvement in non-manufacturing sector. Some Latin American economies also suffered deindustrialization caused by trade liberalization that ultimately increased inequality (Bogliaccini, 2013). Therefore, liberalization reduced employment in manufacturing sector which caused income inequality to grow in Latin America.

Proper manufacturing sector displays unconditional convergence and results manufacturing as major factor of development but deindustrialization stops this sector to work and thus may result into divergence (Rodrik, 2013; 2014). This reason for considering deindustrialization problem may be to its links and implications for the growth convergence process in developing countries. It is evident from existing literature that most of the countries like Pakistan in South Asia share similar economic histories thus facing same implications regarding deindustrialization problem (Khan and Daly, 2018).

Some recent studies present the issue of deindustrialization in perspective of developing economies. Premature deindustrialization is clearly not a good news for developing countries where it stops the major development factor i.e. shifting of workers from rural areas to industry, where their productivity is high (Rodrik, 2016). Same results revealed by Amirapu and Subramanian (2015) regarding Indian economy that manufacturing sector share of output and employment remains same in India during 30 years, which clearly shows the sign of de-industrialization while services sector improved from 35 percent to 50 percent of GDP in India. Macroeconomic outcomes of deindustrialization are allied to comparative economic decline where it categorized by enormous ending and job sufferings in the manufacturing sector. Also greater fiscal disparity, lesser economic ambitions among individuals, inferior capacity to funding community learning, bad health situations, increasing violence, developing amounts of suicide and mortality are consequences of deindustrialization (Van Neuss, 2016). Unavailability of capital and funding, fall in demand, untenable wages and an unfavorable tax environment are factors behind de-industrialization in Bulawayo a city of Zimbabwe based on survey collected data from different companies of different size (Mbira, 2015).

Developing countries predominantly rely on foreign aid and FDI to bridge the domestic savings deficiencies. Efficient use of foreign aid and FDI can lead to strengthened sectoral growth and a slowdown in the deindustrialization process if domestic financial sector is efficient. Due to lacking ability in terms of absorptive capacity and less efficient use FDI shows diminishing returns for growth and human capital (Luqman *et al.*, 2013). Foreign aid is an important determinant of growth at aggregate, sectoral as well as at sub-sector levels in developing countries like Pakistan. Some studies have reported a positive and significant relationship between FDI and education through the channel of human capital (Anwar *et al.*, 2018). Thus, foreign aid and FDI are important in explaining the changes in the deindustrialization.

An active industrial policy will lead to uplift manufacturing growth and address its weakness and empirics showed that there is jobless growth in Pakistan (Waqas and Sial, 2013). Industrial sector share in GDP has decreased due to role of power sector status and trade openness, which resulted deindustrialization in Pakistan, furthermore, deindustrialization has strengthened income inequality and poverty in Pakistan (Yasmin and Qamar, 2013; 2015). The conclusion demands certain electricity provision to industrial sector. Reason behind deindustrialization is simply declining comparative advantage of industrial sector in Pakistan because of tough rivalry with China and India for their value products. In other words, higher the industrial sector growth lower will be the poverty and income inequality in Pakistan. Pakistan is on the edge of premature deindustrialization and industrial sector here is motionless since 2007 (Hamid and Khan, 2015).

Rasiah and Nazeer (2015) investigated the motionless state of manufacturing in Pakistan compared to South Korea, Taiwan and Malaysia from 1960 to 2013. In 1965 manufacturing value added to GDP was almost same in all these countries. Low value added events happened to diminish since 2005. Weak foundation in manufacturing, less practice of new technology, firm's inability to adopt and achieve global best practices and brains are reasons behind uneven growth experience of Pakistan which leads to premature deindustrialization. Empirical investigation

concludes that for the achievement of long run sustainable growth, Pakistan requires up gradation in technology under dynamic industrial policy. Manufacturing expanding from low value added to high value added actions is necessary if manufacturing is to perform the role of driver of economic growth.

3. DATA AND METHODOLOGY

3.1. Theoretical Frame Work

As per most of the studies, like (Kaldor, 1966; 1967; Rodrik, 2009) manufacturing sector's growth leads to improvement in economic growth of an economy. While other sectors also have their relative importance in economic growth but without improving manufacturing sector, expansion in other sectors will not result in overall growth enlargement. This section elaborates the theoretical background, methodology and econometric models of the present study. To examine deindustrialization, time series data techniques have been utilized. This chapter first discusses theoretical background then explains data and estimation techniques and lastly brief introduction of the variables.

The proposed model contains a set of explanatory variables that have association with the dependent variable. Four different explanatory variables have been used in the model that is economically linked to dependent variable i.e. real GDP. Kaldor (1966; 1967) gave the background and postulated manufacturing as the main source of growth which effects an economy in two ways i.e. demand side and supply side of the economy. On demand side manufacturing output has great income elasticity of demand compare to agriculture items. While on supply side manufacturing has larger potential for productivity growth (Dasgupta and Singh, 2006). Kaldor being different from neoclassical explained increasing return to scale. Kaldor (1966) investigated three laws for twelve OECD economies. Taking first law, manufacturing is the engine of economic growth of a country. i.e.

$$Y_t = \alpha_0 + \alpha_1 M_t + \varepsilon_t \quad (1)$$

Where Y_t growth rate of total output and M_t is growth rate of manufacturing output. This law was tested by Dasgupta and Singh (2006) individually on manufacturing sector first and then on agriculture and services sector as well to test premature deindustrialization. The low value of beta coefficient of manufacturing value added as compared to services value added indicates deindustrialization.

3.2. Empirical Model Testing

The importance of manufacturing sector explained earlier argued that a reduction in industrial employment and output causes deindustrialization. This research has examined the effects of deindustrialization on economic performance of Pakistan. Since Cointegration technique is utilized to analyze the association among economic variables and it is a univariate model, so regression model is used. There are three measures used in literature to determine deindustrialization i.e. share of manufacturing employment to total employment, manufacturing value added at constant prices and manufacturing value added at current prices (Hamid and Khan, 2015; Rodrik, 2016). While to estimate deindustrialization, manufacturing value added at constant prices is incorporated as by Dasgupta and Singh (2005); Rodrik (2016). Taking Kaldor's first equation as incorporated by Dasgupta and Singh (2006) the model to be estimated becomes as follows.

$$LGDP_t = \beta_0 + \beta_1 M_t + \beta_2 X_t + \varepsilon_t \quad (2)$$

Where $LGDP$ is dependent variable i.e. natural log of real gross domestic product in constant local currency.

While M_t represents manufacturing value added in constant local currency and X_t is vector of variables that

includes agriculture value added, Services value added and foreign direct investment. Therefore, the econometric model takes the following form:

$$LGDP_t = \beta_0 + \beta_1 LAVA_t + \beta_2 LMVA_t + \beta_3 LSVA_t + \beta_4 FDI_t + \varepsilon_t \quad (3)$$

Where β 's are the parameters of interest to be estimated.

3.3. Data and Construction of Variables

For empirical investigation time series data set is utilized for Pakistan ranging from 1972 to 2017. The data is collected from world development indicators (WDI), World Bank. Following table shows sources of data on variables to be estimated.

Table-2. Variables and definitions

Variable	Description	Measurement
LGDP	Real GDP is defined as nominal GDP divided by GDP deflator in natural log form.	Annual Percent
LAVA	Log of Agriculture Value Added	Constant LCU
LMVA	Log of Manufacturing Value Added	Constant LCU
LSVA	Log of Services Value Added	Constant LCU
FDI	Foreign Direct Investment	Percent of GDP

Source: World Bank, World Development Indicators, 2017

3.4. Empirical Model and Estimation Technique

To empirically investigate deindustrialization in Pakistan time series data is collected and tested for stationary properties. Augmented Dickey-Fuller (ADF) test is utilized to test unit root (Variables whose means and variances change over time are known as non-stationary and are called unit root variables) property of the data that directed to use Autoregressive Distributed Lag (ARDL) approach to investigate Cointegration among these variables. The ARDL modeling technique propagated by Pesaran *et al.* (1999) and Pesaran *et al.* (2001) has several advantages. First, this model is appropriate for small sample size i.e. from 30 to 80 observations Narayan (2004) and secondly it is unrestricted from the issue of endogeneity (Majeed *et al.*, 2010). It moreover does not need pre testing the stationarity of the variables and applicable for variables integrated of I(1) or I(0). But generate spurious results if variables are I(2). So, it is important to test stationarity before applying ARDL technique (Luqman *et al.*, 2013).

3.4.1. Unit Root

If the variables in the regression model are non-stationary then the standard “t-ratios” will not follow t-distribution. In time series data it usually has unit root, therefore testing stationarity of the data is first phase. There are various techniques used to investigate unit root but this study will utilize Augmented Dickey Fuller (ADF) test.

3.4.2. Augmented Dickey Fuller (ADF) Test

The stationarity of the series is found by analyzing unit root. Augmented Dickey Fuller (ADF) unit root test can be shown through following forms of equations.

$$\text{Without constant and trend; } X_t = \sigma X_{t-1} + \varepsilon_t \quad (4)$$

$$\text{With constant and no trend; } X_t = \alpha + \sigma X_{t-1} + \varepsilon_t \quad (5)$$

$$\text{With constant and trend; } X_t = \alpha + \sigma X_{t-1} + \beta T + \varepsilon_t \quad (6)$$

Where X_t is related time series, α is constant (intercept), T is time trend and ε_t is disturbance.

Whether the variable in the level or difference has a unit root is the null hypothesis. By transforming equations (4), (5) and (6) in difference equations by subtracting X_{t-1} from both sides

$$\text{Without constant and trend; } \Delta X_t = \pi X_{t-1} + \varepsilon_t \quad (7)$$

$$\text{With constant and no trend; } \Delta X_t = \alpha + \pi X_{t-1} + \varepsilon_t \quad (8)$$

$$\text{With constant and trend; } \Delta X_t = \alpha + \pi X_{t-1} + \beta T + \varepsilon_t \quad (9)$$

Where $\Delta X_t = X_t - X_{t-1}$ and $\pi = \sigma - 1$. The null and hypothesis in new regression will be, variable has unit root whether it is in level or difference.

3.4.3. Lag Length Selection Criteria

Lag length selection has special position in time series analysis. There are several criterion employed in economic studies for the selection of lag length like “Aikaike’s information criterion (AIC), Schwarz information criterion (SIC), Hannan-Quinn criterion (HQC), Final prediction error (FPE) and Bayesian information criterion (BIC)”. In comparison for small sample AIC and FPE are better selections as AIC and FPE generate the minimum possibility of under estimation amongst all criteria (Liew, 2004).

3.5. Cointegration

If the variables are non-stationary then their stationarity can be taken through difference. How many periods the difference is taken, is called order of integration at that time. If the data of a particular variable is stationary at level then that variable has 0 order of integration or I (0). If one time difference makes a variable stationary then it is integrated of order 1 or I (1). So in case where linear conversion of two or more variables converted stationary then it is called Cointegration. Different techniques are used to analysis Cointegration like Engle and Granger two stage Cointegration approach, Johanson and Juselius Cointegration and ARDL or Bound test for Cointegration. This study will employ ARDL as the order of integration is different and sample size is small.

3.5.1. ARDL / Bound Test

ARDL is also known as bound test introduced by Pesaran *et al.* (1999) and it can be executed in three steps; first step includes long run Cointegration among variables is found and Wald F-test is used for this purpose. It takes null hypothesis that there is no long run Cointegration exists among variables. Calculated F-statistic (Wald statistic) value is compared with the tabulated F-statistic value and if it is higher than the upper bound value of tabulated F-statistic then null hypothesis would be rejected, it means long run Cointegration exists. In case if calculated value is less than the lower bound value of tabulated F-statistic then null hypothesis would be accepted, which means there is no long run Cointegration among variables (Pesaran *et al.*, 1999).

In second step for applying ARDL the long run coefficients are estimated and in third step ECM is estimated on the basis of ARDL specification.

Examining Cointegration among variables in bound testing technique Wald test would be utilized for calculation of F-statistic. High value of F-statistic is not desirable in bound testing approach rather F-statistic is compared with upper bound and lower bound critical value designed by Pesaran *et al.* (2001). If calculated F-statistic exceeds upper bound value then it is concluded that the variables are cointegrated.

3.5.2. Diagnostic Tests

To explore the stability of long run coefficients, cumulative sum (CUSUM) and cumulative sum of squares (CUSUMQ) plots are employed as proposed by Brown *et al.* (1975). It is a time series technique and used when one is not sure about structural change. This technique has benefits as it does not go for the specification when structural break occur and also error boundaries are set for residuals and if the residual line lies between these two error boundaries (The range of critical boundaries is from -2 to +2) then the model will be stable and vice versa. Moreover, the study goes through diagnostic tests for serial correlation, functional form and heteroscedasticity tests. The study utilizes Lagrange Multiplier (LM) test for serial correlation. The null hypothesis of LM test is that there is no serial correlation and also LM test statistic is asymptotically distributed as chi-square. LM test is better choice when there is correct identification of variables. This test is developed by Breusch-Pagan and has advantage that it is sensitive to the normality assumption. For detecting heteroscedasticity, white test has been used. In this test the consistent variance and standard error estimates can be performed and statistical inference can be made about the true parameters. Jarque-Bera test is utilized to test the normality of the model, where skewness and kurtosis of OLS residuals are computed and it is a test of joint hypothesis. The null hypothesis of this test is that the residuals are normally distributed while alternate hypothesis is vice versa. Moreover for analyzing functional form of the model Ramsay's RESET test is used in this study.

Some diagnostic tests are used to evaluate the ARDL model to check the goodness-of-fit of the model under consideration. LM test is used to check issue of serial correlation. Normality test is utilized to check normality of the model. White test is employed to test the problem of heteroscedasticity whereas Ramsey's test for functional form of the model.

3.5.3. The Granger Causality Test

Though regression analysis deals with the dependence of one variable on other, however that relationship among variables does not explain causation or the direction from where the influence happens. So to study the direction of the causation Granger Causality Test is used (Gujarati, 2009). This test involves estimating following pair of regression;

$$X_t = \sum_{i=1}^n \alpha_i Y_{t-i} + \sum_{j=0}^n \beta_j X_{t-j} + \mu_{1t} \quad (10)$$

$$Y_t = \sum_{i=1}^n \gamma_i Y_{t-i} + \sum_{j=0}^n \delta_j X_{t-j} + \mu_{2t} \quad (11)$$

Where X_t and Y_t are variables which must be stationary, μ_{1t} and μ_{2t} are disturbances and it is assumed that they are not correlated.

4. RESULTS AND ANALYSIS

Time series data usually have an issue of non-stationarity and due to the existence of this problem regression generates spurious results. So, it's better to check the problem of unit root first. This study utilizes Augmented Dickey Fuller test (ADF) to check for the existence of a unit root. Following table 3 shows results regarding unit root.

Table-3. Unit Root Results

Variables	Levels		First difference		Order of Integration
	With constant (No trend)	With constant and trend	With constant (No trend)	With constant and trend	
LGDP	0.97	1.64	5.01**	5.01	I(1)
LAVA	0.44	2.52	8.18**	8.10	I(1)
LMVA	0.95	1.91	3.72**	3.77	I(1)
LSVA	2.12	1.82	4.31**	4.82	I(1)
FDI	2.80	4.90**	----	----	I(0)

Note: ** represent 5% level of significance.

Table 3 shows the results of unit root test on the data under consideration by using Augmented Dickey Fuller test (ADF). First variables are taken at level with intercept only and then both intercept and trend. Results revealed that at level, only FDI is stationary while other variables are non-stationary. If the variables are of mix order of integration then it is consistent to use ARDL technique for empirical analysis. Table 4 displays different criterion for optimal lag selection.

Table-4. Lag Selection Findings

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.97	-8.15	-7.95	-8.08
1	420.00	5.62	-18.63	-17.39*	-18.17*
2	39.21*	5.50*	-18.70*	-16.43	-17.87

* Indicates lag order selected by the criterion.

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The Lag is important for ARDL modeling approach. In above table 4 LR, FPE and AIC suggest two lags while SC and HQ suggest one lag. So, on the basis of AIC and FPE criterion maximum two lags are selected for analysis as discussed earlier in section 3.4.3.

The testified results in table 5 propose that calculated F-statistic LGDP/ (LAVA, LMVA, LSVA, FDI) = 16.28, is higher than the upper bound value in all cases. So, it is concluded that there exist long run Cointegration among these variables.

Table-5. Bound Test for Cointegration Analysis

Computed F-Statistic	16.28	
Critical bound	Lower bound	Upper bound
Critical bound's value at 1 percent	3.06	4.15
Critical bound's value at 5 percent	2.39	3.38
Critical bound's value at 10 percent	2.08	3.00

Note: Computed critical bounds are obtained from (Pesaran et al., 2001).

This study also stabilizes the other explanatory variables as dependent variable simultaneously and conclude that in remaining cases, null hypothesis of no long run Cointegration among variables is accepted, (See table 6 below).

Table-6. Wald F-Statistic

Dependent Variable	F-Statistic	Decision
LAVA	0.85	No Cointegration
LMVA	0.29	No Cointegration
LSVA	0.44	No Cointegration
FDI	1.40	No Cointegration

Note: No cointegration at 1 %, 5% or 10% level of significance.

Overall long run and short run coefficients results are incorporated in table 7.

Table-7. Estimated Long Run and Short Run Coefficients

ARDL (1,2,1,0,0) RESULTS BASED ON AIC DEPENDENT VARIABLE IS LGDP		
Variables	Long Run Coefficients	Short Run Coefficients
LAVA	-0.28782* (0.003)	0.17800* (0.005)
LMVA	0.16423 *** (0.076)	0.18403* (0.003)
LSVA	0.42278* (0.003)	0.19855* (0.007)
FDI	0.0011492 (0.862)	0.53973 (0.862)
Constant	2.0970* (0.009)	-----
ECT	-----	-0.46964 (0.000)
R ²	0.76502	0.74545
DW-stat	2.1279	2.1745
Log likelihood	136.1819	138.1286
F-Stat.	8.5831 (0.000)	16.1071 (0.000)

Source: Author's calculations from World Bank Data 1972-2017

Table (8) depicts the results of diagnostic tests as discussed earlier in 3.5.2. Furthermore to test the stability of the model (CUSUM) and (CUSUMQ) plots are utilized.

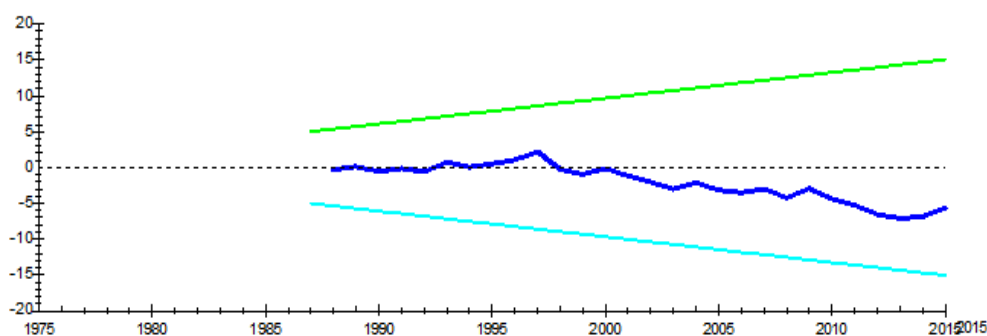
Table-8. Long Run and Short Run Diagnostic Tests

Test Statistic	Value
A: LM Test	0.79 (0.37)
B: Functional Form	1.36 (0.24)
C: Normality	0.32 (0.84)
D: Heteroscedasticity	0.86 (0.35)

A: Lagrange multiplier test of residual serial correlation
 B: Ramsey's RESET test using the square of the fitted values
 C: Based on a test of skewness and kurtosis of residuals
 D: Based on the regression of squared residuals on squared fitted values

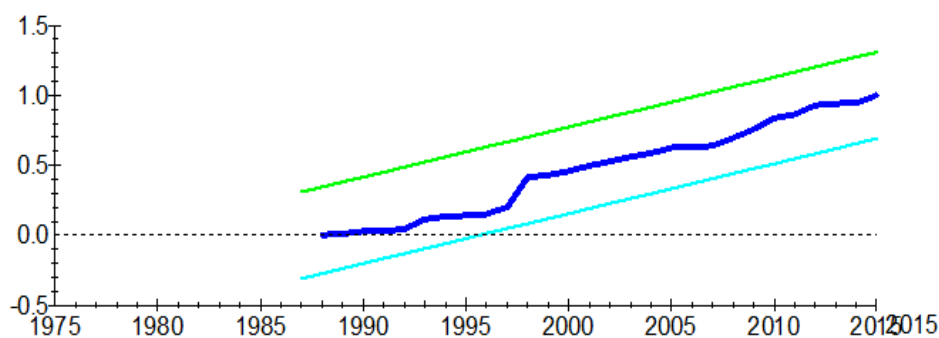
The cumulative sum (CUSUM) and cumulative sum of squares (CUSUMQ) are shown in plots (Fig. 1) from the recursive estimation of the model. It also exhibits stability of the coefficients during sample period 1972-2017.

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Figure-1. Plots of CUSUM and CUSUM of Squares

Source: Author's generated graphs from World Bank Data 1972-2017

For analysis of Granger Causality economic variables must be stationary and that have been proved in the test of unit root (Table 3). All variables are stationary at first difference except FDI which is at level. Results of Granger causality test are given in table 9 below;

Table-9. Results of Granger Causality Test Findings

Null hypothesis	F-Value	P-Value	Result
No Causality between LAVA to LGDP	1.25	0.29	Accept Ho
No Causality between LGDP to LAVA	3.17	0.05	Reject Ho
No Causality between LMVA to LGDP	3.12	0.05	Reject Ho
No Causality between LGDP to LMVA	1.53	0.22	Accept Ho
No Causality between LSVA to LGDP	3.04	0.05	Reject Ho
No Causality between LGDP to LSVA	1.41	0.25	Accept Ho
No Causality between FDI to LGDP	2.44	0.10	Accept Ho
No Causality between LGDP to FDI	3.21	0.05	Reject Ho

Source: Author's generated results from World Bank Data 1972-2017

Above results show that agriculture value added does not cause GDP, rather than GDP cause agriculture value added. While on the other hand manufacturing value added and services value added cause GDP. As Pakistan is predominantly an agrarian economy, still it depends upon developed countries like USA (not agrarian economies) to meet food shortages. Agriculture output although is a small part of GDP of those developed economies that produce more than their requirements. This has happened for them because of a mature industry. This implies that an increase in trade and industry will lead agriculture to increase the GDP of Pakistan (Anwer *et al.*, 2015). Results suggest that increase in manufacturing activity will increase GDP that ultimately expand agriculture output like developed economies. As manufacturing produces machinery and equipment for improvements in agricultural output and quality, and make those economies self-reliant in agriculture even if they are not agrarian economies. And also GDP cause FDI that means being reliant on domestic resources will improve the economy rather than being dependent on FDI.

5. CONCLUSION

The main objective of the study was to test the effect of deindustrialization on economic growth of Pakistan using time series data ranging from 1972 to 2017. Results revealed the presence of deindustrialization in Pakistan. The overall results depict that agriculture sector has no positive impact on growth in the long run, while it effects output growth positively in the short run. On the other hand manufacturing sector and services sector both have positive impact on GDP growth in the long as well as in the short run. Long run results are in line with Dasgupta

and Singh (2006) which suggested that the value of beta coefficient related to manufacturing is much lower than the matching beta coefficient of services and indicates deindustrialization which had prevailed in many Latin American and African economies during 1980s and 1990s. Agriculture sector has negative impact while services sector has more than double impact on growth when compared with manufacturing sector. So it can easily be concluded that Pakistan is becoming service economy without proper foundation of manufacturing sector, which means that manufacturing sector will remain stagnant in the long run, hence indicating deindustrialization in Pakistan.

This situation shows that Pakistan's growth experience is against the claim of Kaldor (1966; 1967) that manufacturing is the engine of economic growth. If this situation remains in long run than it could create more unemployment in future.

While FDI shows positive and insignificant results in the long and short run. The coefficient of FDI shows strong association with growth in short run while weak association in long run. So, it can be concluded that in the long run Pakistan has to direct FDI into manufacturing sector more productively to create employment opportunities in addition to this, emphasis on boosting domestic saving potential.

The results of this study offer attention of the policy makers in following first to improve and expand manufacturing sector through more budgetary allocations for tackling deindustrialization. Secondly, there is need to harmonize the structural transformation process through new industrial policies so that manufacturing sector can play its role as engine of economic growth for boosting services as well as agriculture sector as inline to (Badiane, 2012). There is need to rely less on FDI and efforts are required to develop other channels like institutional development to effectively utilize domestic resources like tax revenues and savings potential. Additionally, more focus on industrialization by curbing service sector growth will help a better growth in both Industry and agriculture (Cáceres, 2017). This will render the growth journey smoother and sustainable.

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