An Analysis of Exploring the Relationship between Foreign Inflows and Sectoral Output of Pakistan

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Abstract
The study aims at investigating the relationship between foreign inflows and sectoral output of Pakistan using time series annual data for the period from 1972 to 2013. Following Solow growth model, the results suggest positive relationship of employed labor force, investment, foreign direct investment, foreign aid and workers' remittances with sectoral output of Pakistan while trade deficit is negatively correlated with sectoral output. According to some diagnostic statistics, the regression model is free from autocorrelation problem, residuals are normally distributed and there is no specification problem.
Keywords: Agriculture Sector Output, Industrial Sector Output, Services Sector Output, Foreign Direct Investment, Trade Deficit, Foreign Aid, Workers' Remittances.
JEL Classification Codes: B13, C32, C82, E13, E22, E23, E24, F35.

1. Introduction

Pakistan is one of the largest countries in Asia with reference to Population. Total Population of Pakistan is approximately 191.71 million among which 60.09 million approximately are considered as a part of civilian labor force. Having 31 percent of population as labor force, it is a surprise that a nation is still less developed and a part of middle income developing countries. It is not a fault of nation that is suffering from various major problems like energy crisis, poverty, unemployment, negative trade, fiscal deficit, hunger, inequality, low literacy rate, lawlessness, injustice etc but only policy makers are responsible for that. A huge labor force just need right direction to use its energies. Labor force is huge but majority of them are illiterate, unskilled or semi-skilled. If some are trained and highly qualified they do not feel security in Pakistan due to government policies and they serve in foreign countries.

Due to all these issues and policies, the nation is lacking behind in getting attention of foreigners in a sense that they come Pakistan to start developmental projects in form of foreign direct investment or they trade with Pakistan and purchase Pakistani manufactured commodities. In other way, due to availability of foreign inflows in Pakistan, our economy may grow faster in terms of sectoral output. In recent years, it may be noticed that how foreign direct investment, net trade, foreign aid and workers' remittances are falling every year and it is obviously affecting investment level of Pakistan. All the sectors of economy are affected by low level of foreign inflows whether it is an agriculture sector, industrial sector or services sector, it is directly affected by low foreign inflows.

Considering the importance of foreign inflows in Pakistan in terms of sectoral output, the researchers of the study are motivated to investigate the influence of foreign inflows on sectoral output. The study may be divided into five sections. Apart from Introduction in section 1, section 2 reviews the previous studies related to current issue. Data, model and methodology are described in section 3. Results are elaborated in section 4. Section 5 concludes the whole discussion and also suggests some policies. Lastly references are given.

2. Review of the Literature

A number of studies have been conducted on the issue of foreign inflows and economic growth, or real GDP but few of them are related to specifically sectoral output. Few of them are elaborated here as below.

Siddiqui and Malik (2001) examined the effect of debt accumulation as major factor affecting the growth rate. Time series data for the period 1975–98 was collected for the analysis. Results were estimated using OLS and Fixed Effect Model. The effect of openness was noticed as positive in the study.

Atique et. al (2004) examined the impact of trade policy regime on foreign direct investment contributed to economic growth. The study used time series data over the period 1970 to 2001 in Pakistan. They applied Engle Granger and Hansen techniques for the estimation of results. Overall effect of foreign direct investment on economic growth was found to be positive in Pakistan.

Iqbal & Sattar (2005) examined collected time series data for 1972-73 to 2002-2003 in order to examine

the contribution of workers' remittances to economic growth of Pakistan and concluded this relationship as positive.

Ayanwale (2007) examined the relationship between foreign direct investment and economic growth in Nigeria. The annual time series data was gathered from 1970 to 2002. Ordinary least square method was applied for the estimation of results. The positive and statistically significant relationship between economic growth and foreign direct investment was established in the research.

Mallik (2008) investigated the relationship between foreign aid and economic growth in the six poorest African countries. The study collected time series data for the period 1960-1990. Co-integration technique was applied for the estimation of results. The foreign aid had positive effect on the per capita real gross domestic product.

Attari et al. (2010) examined the relationship between foreign direct investment and different macro-economic variables such as gross domestic product, exports and imports in Pakistan. The study collected time series data for the period from 1981 to 2009. Ordinary least square method was used for the estimation of result. The study found coefficient of GDP and exports as positive declaring positive relationship between FDI and GDP. Similarly coefficient of imports was negative. There was examined Bi-directional causality between GDP, Exports and Imports.

Sulaiman and Azeez (2012) examined the impact of external debt on the economic growth in Nigeria. The research used time series data collected from the 1970 to 2010. The econometric techniques of Ordinary Least Square, Johansen Cointegration and Error Correction Method were applied for the estimation of results. The External Debt had a significant negative influence on GDP.

Nawaz et. al (2012) analyzed the long run and short run relationship between external debt and economic growth in Pakistan. The authors collected time series data for the period 1980 to 2010 and applied Johansen Cointegration with some other econometric techniques for the estimation of results. The study found negative relationship between external debt and gross domestic product.

Boboye and Ojo (2012) investigated the effect of the external debt burden on economic development of Nigeria. The study collected time series data form 1980-2010 and applied ordinary least square method for estimation of result. The results showed positive relationship between the External debt and National income.

Javid et al. (2012) examined the importance of foreign remittance with Economic growth in Pakistan. Time series data was collected for the period from 1976 to 2006. The positive relationship between economic growth and remittances was notices in long run. It was negative in the short run.

3.   Data and Methodology

3.1   Data, Sources and Estimation

The present study collects time series annual data of Pakistan for the period from 1972 to 2013. For estimation of elasticities, log – log or double log form of the equation is utilized. Data on all the variables are collected through various sources like Economic survey of Pakistan 2013 – 14 and Hand book of statistics on Pakistan Economy 2010. Data on all the variables are gathered in similar units as Millions or Million rupees. For estimation of econometric results, Multiple Regression Analysis is used in the study with necessary diagnostic statistics.

3.2   Model Specification

According to objectives of the study, following models are specified separately for Agriculture, Industry and Services Sectors. The study incorporates Solow Growth Model by keeping Labor and Capital as important variables. Employment labor force and Investment are taken as proxy of labor and capital in the study.

$$LAGRI = \alpha_1 + \alpha_2 LLAB + \alpha_3 LCAP + \alpha_4 LFDI + \alpha_5 LWREM + \alpha_6 LTD + \alpha_7 LFAID + \mu_i$$
$$LIND = \beta_1 + \beta_2 LLAB + \beta_3 LCAP + \beta_4 LFDI + \beta_5 LWREM + \beta_6 LTD + \beta_7 LFAID + V_i$$
$$LSERV = \gamma_1 + \gamma_2 LLAB + \gamma_3 LCAP + \gamma_4 LFDI + \gamma_5 LWREM + \gamma_6 LTD + \gamma_7 LFAID + w_i$$

Where $\alpha's, \beta's, \gamma's$ are parameters and μ_i, v_i, w_i are error terms of the regression equation. All variables are taken in natural log forms. Definition of the variables, expected relationships and units of measurement are given in table 1.

Table 1: Definition of variables

Variable	Definition	Expected Relationship	Unit of Measurement
LAGRI	Agriculture Sector Output		Million rupees
LIND	Industrial Sector Output	Dependent Variables	Million rupees
LSERV	Services Sector Output		Million rupees
LLAB	Employed Labor force	Positive	Million
LCAP	Investment	Positive	Million rupees
LFDI	Foreign Direct Investment	Positive	Million rupees
LWREM	Workers' Remittances	Positive	Million rupees
LTD	Trade Deficit	Negative	Million rupees
LFAID	Foreign Aid	Positive	Million rupees

3.   Foreign Inflows: Econometric Results

Econometric results of sectoral output are reported in tables 2, 3 and 4 consisting on five columns. Column 1 shows the names of variables used in the study, coefficients against each variable are provided in column 2. 3rd column reports the standard errors of each variable. t – Statistics are calculated by taking ratio of column 2 and column 3 and its values are provided in column 4. Probability values are shown in column 5 against each variable.

Employed Labour Force has positive relationship with agriculture sector, industrial sector and services sector outputs with significant coefficient values. On the average, one percent increase in employed labor force will lead to 2.66, 1.59 and 1.94 percent more output of agriculture sector, industrial sector and services sectors respectively. The reason may be that if employed labour force is increased, level of production of goods and services will also increase accordingly which will definitely lead to all sectors of the economy i.e. agriculture, industry and services.

Table 2: Agriculture Sector Output

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	-3.986391	0.909457	-4.383264	0.0002
Employed Labor Force	2.668080	0.997818	2.673915	0.0128
Investment	0.702883	0.217775	3.227557	0.0034
Foreign Direct Investment	0.183064	0.055234	3.314368	0.0027
Foreign Aid	0.162614	0.087687	1.854478	0.0750
Trade Deficit	-0.105087	0.050378	-2.085950	0.0469
Worker Remittances	0.018450	0.088345	0.208840	0.8362
R-squared	0.99	Probability (F-statistic)		0.0000
Adjusted R-squared	0.98	Durbin-Watson stat		1.60

Overall investment is positively correlated with all sectors of the economy i.e. agriculture, industry and services. Statistically, the values of coefficient are 0.70, 0.82 and 0.83 with highly significant probability value (0.00). The reason of this relationship may be that investment is necessary factor for promotion of all sectors. It creates new jobs for people due to more industrialization and Mechanization. Ultimately, it results in raising sectoral output of Pakistan in the long run. On the average, one percent more investment will be a cause of 0.70, 0.82 and 0.83 percent higher output of all sectors.

Positive influence of Foreign Direct Investment is found on all sectors of the economy like agriculture, industry and services in the present analysis. Investment through foreigners keeps high efficiency level when it is compared with investment through citizens of Pakistan in every field of business. Due to this efficiency, results are development of all sectors. Agriculture sector gets mechanized tools of farming; industrial sector receives latest production plant that produces at minimum cost. Services sector enjoys upgraded and comfortable working environment. All these things are enhancing productivity of agriculture sector, industrial sector and services sector due to more foreign direct investment.

Table 3: Industrial Sector Output

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	-2.883416	0.600807	-4.799237	0.0001
Employed Labor Force	1.598783	0.659180	2.425410	0.0225
Investment	0.822838	0.143867	5.719428	0.0000
Foreign Direct Investment	0.056268	0.036488	1.542084	0.1351
Foreign Aid	0.088420	0.057928	1.526378	0.1390
Trade Deficit	-0.090924	0.033281	-2.732002	0.0112
Worker Remittances	0.031963	0.058363	0.547668	0.5886
R-squared	0.99	Probability (F-statistic)		0.0000
Adjusted R-squared	0.98	Durbin-Watson stat		1.64

As expected, foreign aid has positive impact on agriculture sector, industrial sector and services sector of Pakistan because when government receives foreign aid and invests in various developmental projects like poverty alleviation program, agriculture loan, infrastructural development, high variety of seeds and in different types of industries it will gear up all the sectors of economy and results in higher productivity, employment and growth. In case of Pakistan, foreign aid is turned out to be significantly positive.

Table 4: Services Sector Output

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	-3.415637	0.666194	-5.127093	0.0000
Employed Labor Force	1.940163	0.730920	2.654414	0.0134
Investment	0.835952	0.159524	5.240274	0.0000
Foreign Direct Investment	0.122034	0.040460	3.016197	0.0057
Foreign Aid	0.120852	0.064232	1.881481	0.0711
Trade Deficit	-0.108295	0.036903	-2.934576	0.0069
Worker Remittances	0.062912	0.064714	0.972150	0.3399
R-squared	0.99	Probability (F-statistic)		0.0000
Adjusted R-squared	0.98	Durbin-Watson stat		1.69

A trade deficit occurs when the value of a country imports is greater than the value of its exports. It means that the country balance of trade is negative so trade deficit has negative relationship with agriculture sector, industrial sector and services sector during 1972 to 2012. The values of coefficient are negative with significant t – ratios. It may be justified as higher trade deficit is an indication that nation is consuming imported goods as compared to locally manufactured. It will affect demand of agricultural and industrial products negatively. Lower demand will be a cause of declining agriculture, industrial sector and services sector. On the average, it may be stated that one percent increase in trade deficit will lower agriculture sector output, industrial sector output and services sector output by 0.10, 0.09 and 0.10 percent respectively.

Workers' Remittance is found to have positive relationship with agriculture sector, industrial sector and services sector. The values of coefficient are not significant in all the models. Pakistani workers / Overseas Pakistanis work in foreign and remit back their income / saving to Pakistan. As a result, it will give rise to agriculture sector, industrial sector and services by providing more funds for investments.

3.1 Diagnostic Statistics

Table 5 shows the results of Normality test using Jarque Bera test statistics. Null hypothesis for this test is that Residuals are normally distributed. Here probability value is greater than 0.10 showing that we may not be able to reject null hypothesis and may conclude that residuals of regression equation are normally distributed.

Autocorrelation is a sensitive issue of time series data estimation. Regression results are unfavorable if there is any symptom of autocorrelation. For examining this problem, we have used Breusch – Godfrey Serial Correlation LM test presented in table 5.5. The null hypothesis of this test is that there is no problem of autocorrelation within the regression model. Its probability value is greater than 0.10 suggesting that our regression model is not having such problem as we may not be able to reject Null hypothesis based on probability value.

For investigating the problem of Misspecification of the model, the study uses Ramsey RESET test. Null hypothesis is that regression model is correctly specified. Probability value is 0.10 suggesting that we may not be able to reject null hypothesis and it confirms the regression model as correctly specified.

Table 5: Diagnostic Statistics

Diagnostic Tests	Agriculture Sector Model		Industrial Sector Model		Services Sector Model	
	Test Stat.	Prob.	Test Stat.	Prob.	Test Stat.	Prob.
Normality Test	2.35	0.31	1.63	0.44	2.26	0.32
Autocorrelation	1.71	0.19	1.51	0.23	2.29	0.14
Model Specification	0.12	0.90	0.55	0.58	0.67	0.51

5.   Conclusion and Policy Recommendation

The study is conducted to analyze the impact of the foreign inflows on sectoral output of Pakistan. Foreign inflows are determined by Foreign Direct Investment (FDI), Trade Deficit (TD), Workers' Remittances (WREM) and Foreign Aid (FAID) and sectoral output is dependent upon Agriculture Sector Output, Industrial Sector Output and Services Sector Output.

For that purpose, the research uses time series data for the period from 1972 to 2013. Log – Log forms of the equations are utilized for comprehensive results. Estimates are analyzed using Multiple Regression Method (Ordinary Least square). Some diagnostic statistics are also applied for validity of econometric results like Jarque Bera, Breusch Godfrey Serial Correlation LM test and Ramsey RESET test. Employed labor force and Investment is included in multiple regression models as a proxy of Labor and Capital as suggested by Solow growth model.

Findings conclude that employed labor force, investment, foreign aid, workers' remittances and foreign direct investment of Pakistan have positive relationship with sectoral output. All these variables give rise to output of agriculture sector, industrial sector and services sector as well. Only trade deficit is providing inverse influence on sectoral output. It is not in benefit of Agriculture, Industrial and Services Sector Output in Pakistan. Diagnostic statistics suggest that the multiple regression models are free of autocorrelation, residuals are normally distributed and regression model is correctly specified.

On the basis of econometric results, it may be suggested that foreign inflows must be encouraged by providing foreigners all the safety measures from criminal activities. Law and order situation of Pakistan must be furnished to attract foreigners.

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